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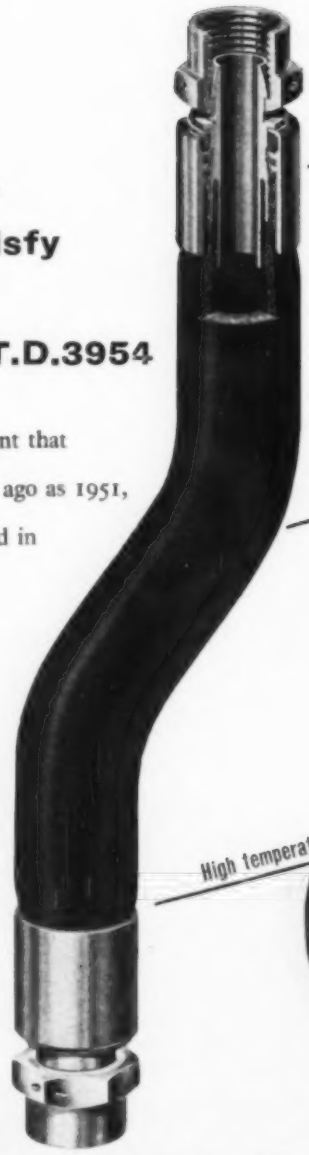

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This specification is so stringent that although it was issued as long ago as 1951, no manufacturer has succeeded in satisfying it until now.

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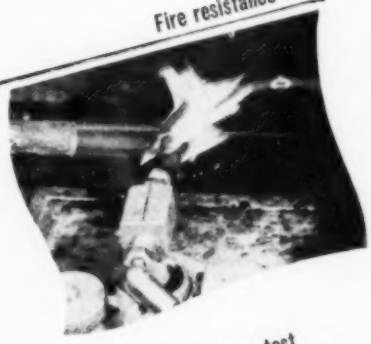
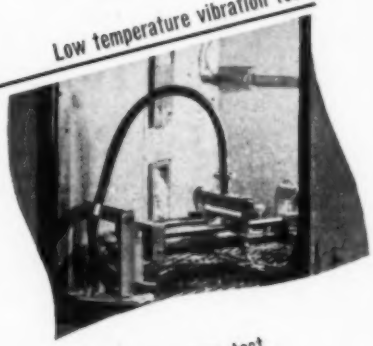
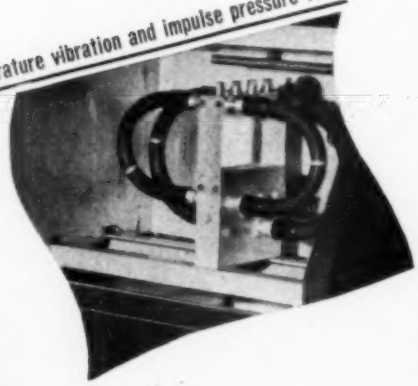


Low temperature vibration test



High temperature vibration and impulse pressure test



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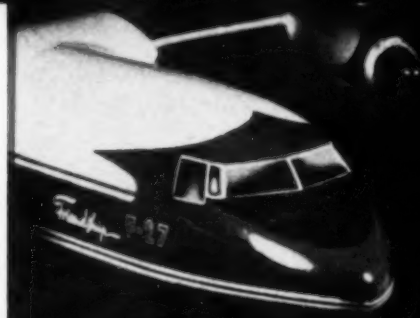

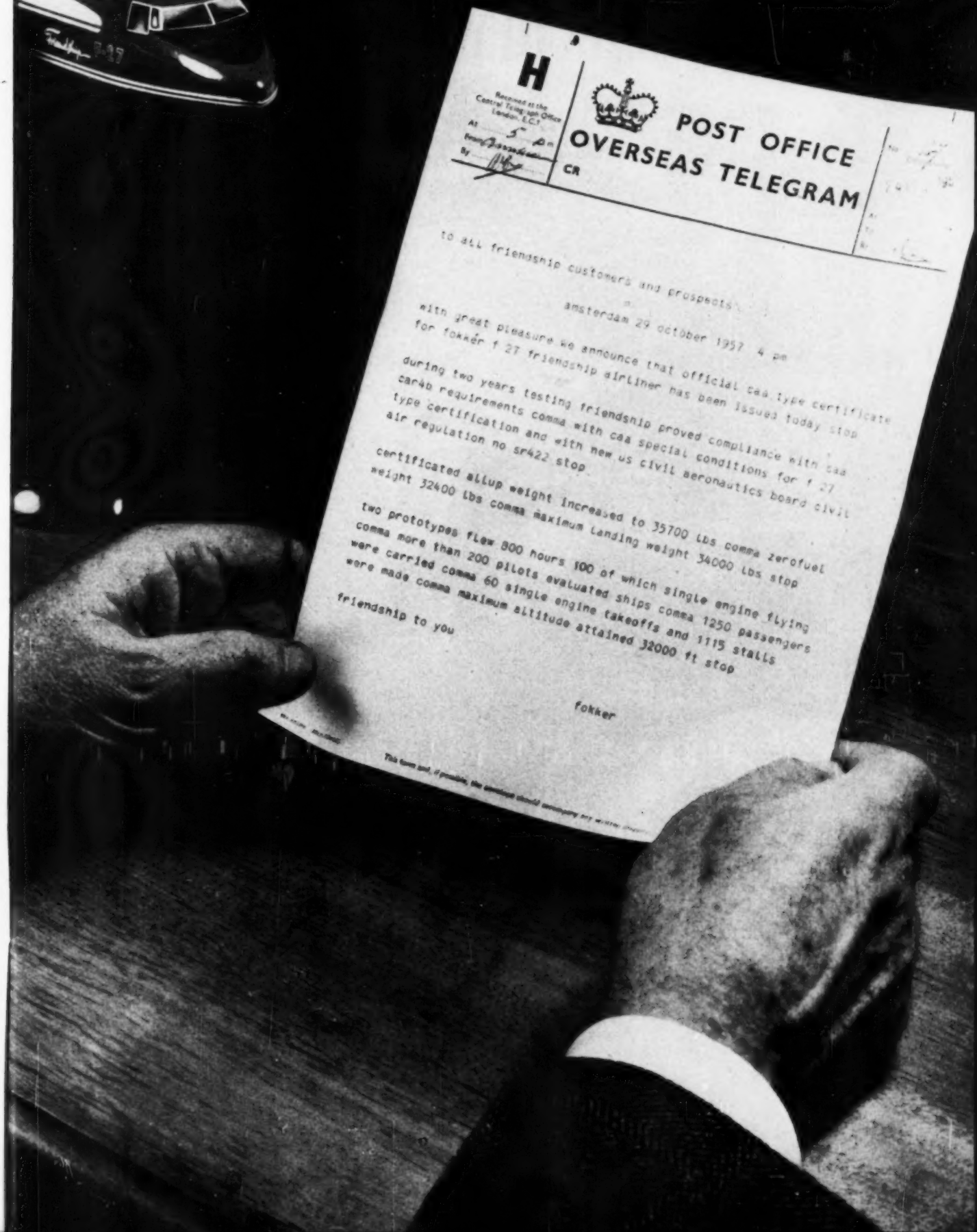

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with great pleasure we announce that official caa type certificate for fokker f 27 friendship airliner has been issued today stop

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certificated allup weight increased to 35700 lbs comma zerofuel weight 32400 lbs comma maximum landing weight 34000 lbs stop

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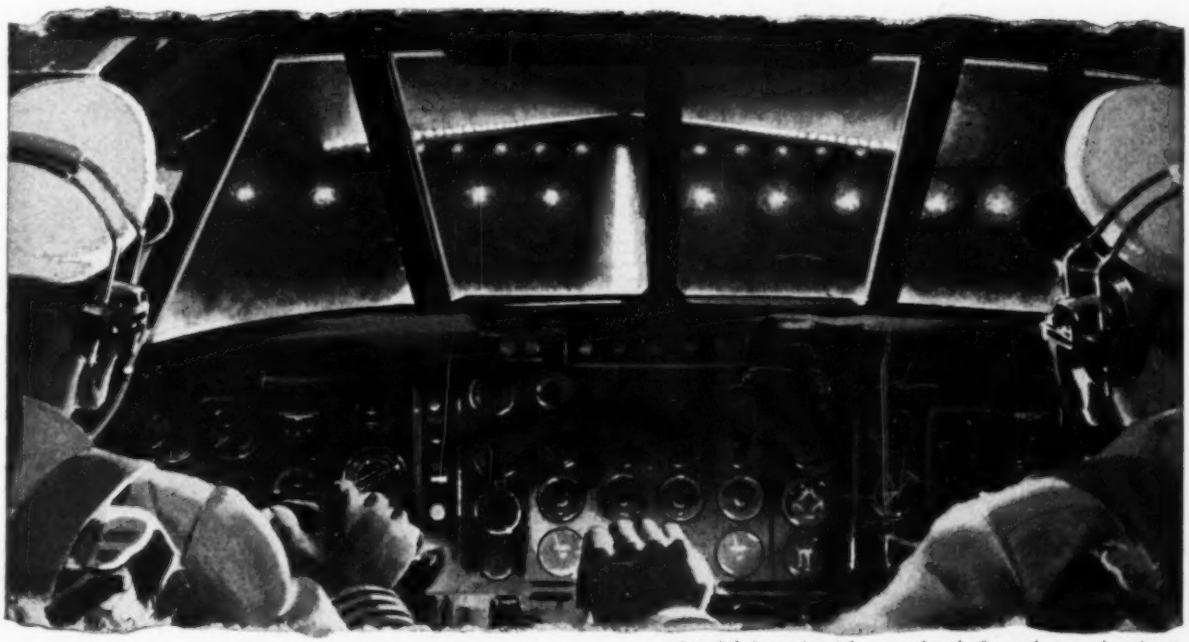
Electrification of the Modern Airport



An artist's impression of the approach to the flare-path at a modern airport

Out of the night sky, the airliner descends in a long and gentle glide. From many miles distant, the location beacon has been picked up. Now, over to port, the identification beacon flashes the airport signal and, ahead, approach lights point the way to the runway lighting. Safely down, the flight is over.

Airport lighting has become a complex science—a far cry from those first night flights made in the beam of car headlamps. And the G.E.C., with its wealth of experience and highly specialised staff, has long been associated with the development of the lighting demarcation system now almost universally standardised. Approach, runway and taxiway lighting layouts, loading and maintenance floodlights, hangar, roadway and car park lighting and ground traffic control systems reflect the vital contribution made by the G.E.C. in this important field.

Lighting, however, is but one facet of the electrification of the modern airport. G.E.C. installations embrace telecommunication systems for aircraft and passenger control, electric cooking equipment for the airport flight kitchens and electrically heated food containers enabling hot food to be served in flight—also equipment for aircraft maintenance and for the maintenance and administration of the airport itself. In addition, the Company supplies the sub-stations, switchgear and circuits that are required for power distribution and lighting control.

Equipment that complies with the standards of the International Civil Aviation Organisation has been installed by the G.E.C. on airports in every part of the world.

G.E.C.

THE GENERAL ELECTRIC CO. LTD., MAGNET HOUSE, KINGSWAY, LONDON, W.C.2

for all indicator purposes

Thorn miniature lampholders

Miniature lampholders in the Thorn range have been made possible by the development of the Atlas Midget Panel bulb.

These types of midget panel bulbs are available
28 volts 0.04 amps
12 volts 0.1 amps
6 volts 0.1 amps

MINIATURE SEALED PANEL LAMPHOLDER – INDICATOR TYPE

Completely waterproof and will withstand conditions of constant vibration and shock, these lampholders are intended for installation on aircraft, armoured fighting vehicles, and marine equipment. They are sealed and insulated from the panel, the thickness of which can vary from 20 S.W.G. (.036") to 10 S.W.G. (.128"). Thicker panels can be counterbored. Rotation is prevented by flats on the body. Mounting is by a single hole. Access to the lamp, for replacement, is from the front of the unit by unscrewing the dome. Lamps may be renewed, without breaking the seal to the equipment.
Weight: .420 oz. (11.6 grammes) with bulb.
Electrical connections: Two solder tags.
Catalogue No. MPL. 20 Red: MPL 21 Green.
Catalogue No. MPL. 22 Amber: MPL 23 Opalescent Ivory.

MINIATURE SEALED PANEL LAMPHOLDER – DIMMER TYPE

Identical to the Indicator type, except for the interchangeable cap. This is ribbed for grip, continuously rotatable and contains a light output control from bright to "blackout".
Weight: .530 oz. (14.8 grammes) with bulb.
Electrical connections: Two solder tags.
Catalogue No. MPL. 10 Red (Translucent).
Catalogue No. MPL. 11 Green (Transparent).
Catalogue No. MPL. 12 Amber (Transparent).
Catalogue No. MPL. 13 Clear (Transparent).

THORN MIDGET PANEL LAMPHOLDER

This is the simplest and most economical lampholder designed to accommodate the Atlas Midget Panel lamp. It is extremely effective and easily installed. Available with its transparent top in a variety of colours. Weight: 8.4 gr. (0.3 oz.).
Can be supplied with insulated washers and connecting tags where non-earth return is desirable.

FLUSH OR RECESSED LIGHTING UNIT

This lampholder is used as a standard unit in the Plasteck Console panel. The body of the lampholder may be retained in a countersunk hole in the panel by a hexagonal backnut and lock-washer. A small projection under the collar prevents the fitting turning in the panel. The special coloured filter is contained in a moulded screw cap and a soft rubber sealing washer prevents any light from escaping round the edge. Filters in red, green, amber and clear. Weight: .31 oz. with bulb.
Terminals: Solder tag and earth return.
Catalogue No. PPL90.
Catalogue No. PPL120 (with 6BA terminal screw and earth return, weight: .35 oz. with bulb).
Interservice ref: Type A, No. 1.
Flush type—Solder connections. Ref. No. 5C/X. 5143.
Type A, No. 2.
Flush type—Screw terminals. Ref. No. 5C/X. 5144.
Can be supplied with insulated washers and connecting tags where non-earth return is desirable.

SURFACE TYPE LIGHTING UNIT

An alternative design to PPL90 for Plasteck and other control panels where no room exists immediately behind the metal panel. The bulk of the component projects above the face of the panel. A soft rubber sealing washer under the cap prevents the escape of light from the front of the panel. The lamp is inserted with the cap up.
Weight: .49 oz. with bulb.
Terminals: Solder tag and earth return.
Catalogue No. PPL. 100.
Interservice Ref: Type B,
Surface type—Ref. No. 5C/X. 5145.

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AIRCRAFT COMPONENTS DIVISION,
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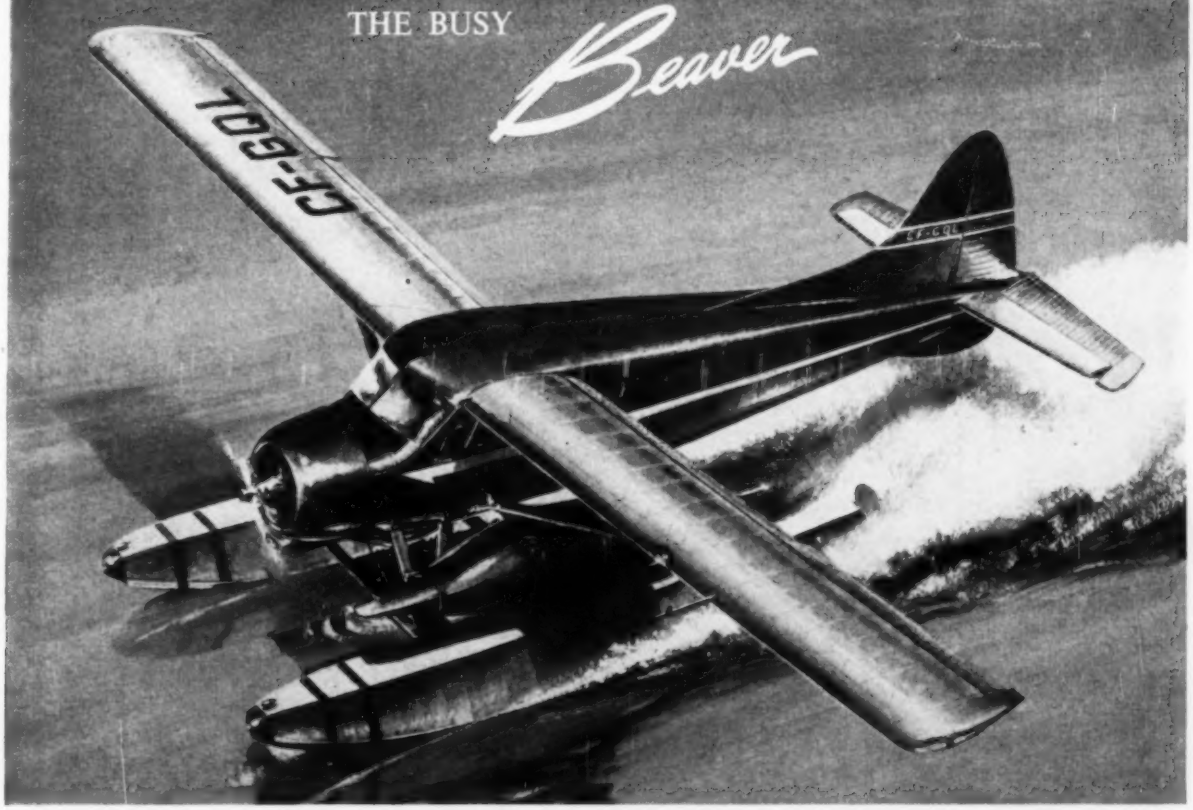

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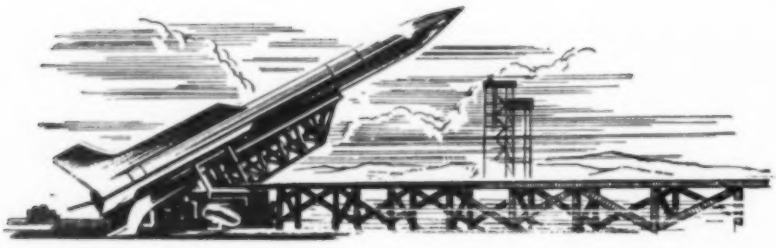

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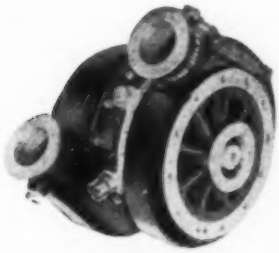
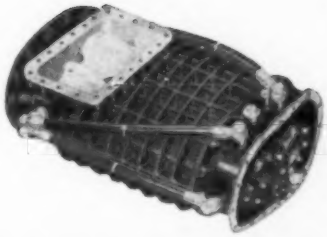
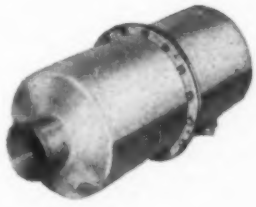
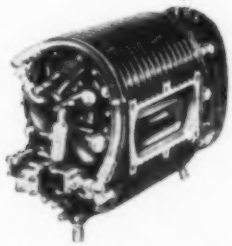




GODFREY — aircraft equipment





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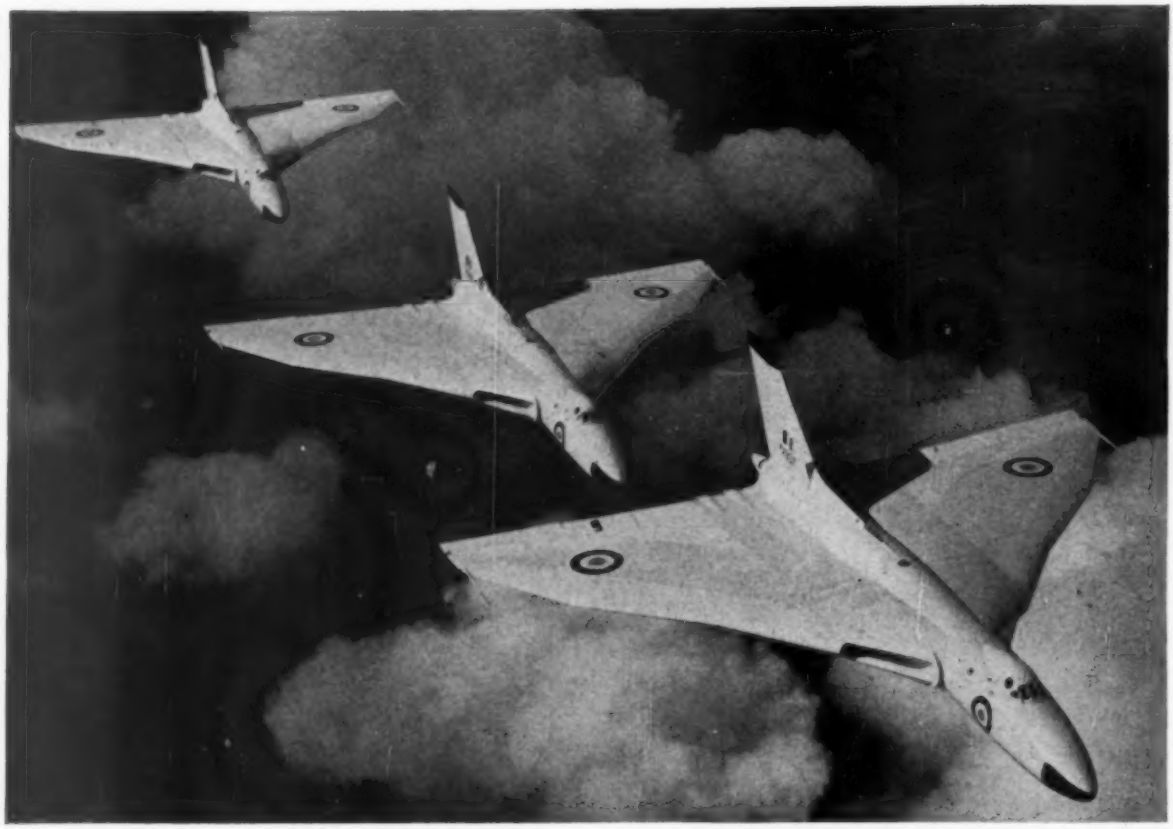

"Equal to, if not better than, any Bomber in the World"

—Mr. C. I. Orr-Ewing, Under Secretary for Air.

In announcing that the famous 617 Squadron—the Dam Busters—is to be reformed and equipped with the Avro Vulcan Delta Bomber, believed to be the fastest bomber in service anywhere, Mr. Charles Ian Orr-Ewing, Under Secretary for Air, has said that in the Vulcan "we now have a bomber aircraft which is equal to, if not better than, anything else in the world".

"The Vulcan comes from a good stable"

In addition to Mr. Orr-Ewing's tribute, the Air Officer Commanding No. 1 Group, Bomber Command, had this to say: "We are extremely pleased with the Vulcan, both from the operating and the maintenance aspects. The way in which this large aircraft and its complex system has been brought into use in the front line of Bomber Command, without any of the enforced groundings so frequently experienced with new types of aircraft, is most gratifying. The Vulcan is giving us splendid utilization; indeed, it is far better than we experienced with any other type of aircraft, large or small. The Vulcan comes from a good stable and is liked by the servicing crews as well as the flying crews."

We are proud of our stable—from it have come: *the Avro '504'—the first long-range bomber of World War 1; the faithful Anson; the immortal Lancaster, used by the Dam Busters in World War 2; and now the Vulcan.*

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FIRST AERONAUTICAL WEEKLY IN THE WORLD FOUNDED 1909

FLIGHT
and
AIRCRAFT ENGINEER

No 2546 Vol 72 FRIDAY 8 NOVEMBER 1957

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In this issue

728 The Business Aircraft Market
730 Air Cargo—The Next Decade
733 The Sopwith Tabloid, Schneider and Baby
738 The Fretful Sky
740 Weapon System
741 Carrier Work-up
745 No. 5 Squadron—Part 3
747 The View Ahead

Russia on Record

FOR a nation of propagandists the Russians display a marked disinclination to proselytise in aviation. They are so old-fashioned as to prefer their products to speak for themselves. They believe, apparently, that an entry in *Records Officiels Homologués*, issued by the Fédération Aéronautique Internationale, is to be valued above a million puff paragraphs in the world press; and if we are not mistaken, the attribution "U.S.S.R." will be appearing with increasing frequency in that unpretentious bulletin. A few weeks ago we reported that a Tu-104, carrying a ten-ton load, had averaged 604 m.p.h. over 1,000 km, having reached about 640 m.p.h. on several occasions—fair going for an aeroplane which has been described as a lash-up.

From transports (we make only passing allusion to the challenging Ukraina, Moskva, Tu-110 and Tu-114) we are obliged by events to turn to helicopters, noting that the F.A.I. credits the records for 1,000 and 2,000 kg loads to a Soviet Mi-4. Recalling the resonance set up in Western helicopter circles when those records were established in 1956, we can only hope that the performance of the prodigious new Mi-6—a lift of 12 tons to 6,500ft—will not induce a catastrophic flutter.

[Since the above remarks were put to paper the second satellite has been set in orbit. But as we have seen, not all the portents are observed in outer space. Increasingly they are "subject to F.A.I. homologation."]

Doing Business with Business

QUITE by coincidence, our "Business and Touring Aircraft" issue of October 11 synchronized with the setting up of the Royal Aero Club's Business Aircraft Users' Committee, and with some relevant observations in the R.Ae.C. *Gazette*. Such has been the growth of business flying in the United States, the *Gazette* reported, that, at the request of a number of operators, both of aircraft and of ground bases, the Federal Communications Commission has allocated two radio frequencies ("hamburger channels") for the use of executive aircraft. "All we need to have over here, of course," was the journal's heart-cry, "is radio at a price we can all afford; these refinements can come later."

However assiduous, the new committee is unlikely to secure immediate benefits for British business flying—though as confirmed operators ourselves (one Gemini IIIa) we acclaim it with hope and joy. Our own business being the promotion of new business within the business business we draw attention this week to the bonanza which beckons from the dollar-rich range of American commerce.

As in any good gold rush, the most exciting and contrasting reports are being put about by different prospectors, though the optimism of competent assayers does not run so high as some predictions we have heard. U.S. executives are now operating some 20,000 aeroplanes, of which a thousand or so are "heavy twins" in the DC-3/Lodestar/Convair 240 bracket; and it has been extrapolated from present figures that as many as 2,000 turbine-powered executive transports in broadly the same group will be operating ten years hence.

Less sanguine were delegates at the recent meeting of the American National Business Aircraft Association. There was considerable feeling (reports *American Aviation*) that jet and turboprop machines would be less in demand than had been hoped. The most optimistic estimate was that possibly 300 would be absorbed by business aviation; and a more realistic analysis indicated a market for only about a hundred of the "million dollar models" (that is, Lockheed JetStar and On Mark Marksman). In any event, a lot of dollars will be changing hands from 1958 onwards, and there is no reason why a share should not be coming this way. True, the Accountant is Britain's only "heavy twin" offering at the moment; but this journal's surprise would only be equalled by its disappointment if one or two genuine imported British-styled executive airplanes were not already on the boards.

Meanwhile, the engines of the principal contenders—American, British and Dutch—carry a Derby or Filton label

FROM ALL QUARTERS

Russia's Second Satellite

FOR the second time within one month, world opinion was shaken by a Russian announcement—last week-end—that an artificial satellite had been launched. This second Sputnik carried equipment weighing no less than half a ton, the maximum height of its orbit was over 1,000 miles, and—dramatic news indeed for the dog-loving British—the object contained a live husky bitch.

The size and weight of the final stage of the satellite are of an order quite outside anything previously contemplated in the West. Publication of the weight of the "payload" as 1,120 lb indicates that the complete satellite must weigh at least 2,000 lb and that the launching weight of the whole vehicle probably exceeds 250 tons. It is of great significance that a Russian spokesman stated that "new sources of power"—presumably rocket fuels of very high specific impulse—were employed.

The Tass statement on the launching on November 3 said:—

"In accordance with the programme for the study of the upper layers of the atmosphere as well as for the study of the physical processes and conditions of life in cosmic space, on November 3 in the Soviet Union there was launched a second artificial Earth satellite.

"On board the second artificial satellite there are: apparatus for studying solar radiation in the short-wave, ultra-violet and Röntgen region of the spectrum; apparatus for studying cosmic rays; apparatus for studying temperatures and pressure; a hermetically sealed container with an experimental animal—a dog—inside (it being air-conditioned and having a supply of food and instruments for studying its living functions under cosmic space conditions); and measuring apparatus for transmitting various scientific observations to the Earth.

"Two radio transmitters are working on frequencies 40.002 and 20.005 Mc/s (wavelength about 7.5 and 15 metres). The total weight of all the above apparatus, the experimental animal, and the power supply is 508.3 kg (about 1,120 lb). According to observation data the Sputnik was given an orbital speed of about 8,000 metres per second. According to calculations which are being made more exact by direct observations, the maximum distance of the Sputnik from the Earth's surface is over 1,500 km (about 935 miles). The time of one complete circuit is one hour, 42 minutes. The angle of inclination to the equator is approximately 65 degrees. . . .

"The collectives of the Scientific Research Institutes, the Design Bureaux, the experimenters and industry which have created the second Soviet artificial Earth satellite, dedicate its launching to the fortieth anniversary of the great October Socialist Revolution."

Moscow Radio later quoted a Soviet scientist as saying that the dog, a husky named Laika (Little Barker), was comfortable in its container, which would be cast off by the satellite after a certain time and would return to Earth. The satellite's radio transmissions would give advance notice of this, and it should be possible to work out the dog's probable landing position on Earth. The dog-container was fitted with a special brake which would prevent it entering orbit as a third satellite, and in the final stage of the descent the dog, parachute-equipped, would be ejected from the container at a height of only a few thousand metres.

Professor Blagonravov, one of the designers of the first satellite, said, "The life of the dog is safe. It is getting artificial food and carrying instruments registering such functions as breathing, heart-beat, blood-pressure, and the data thus received through the signalling system will serve for our physiologists as a tremendous help in their further work on problems of cosmic flight. The dog has already done rocket trips and in addition it has undergone training in conditions closely resembling those in which it is at present."

Reporting on the progress of the second satellite on the evening of November 3, Moscow Radio stated that its period of rotation was one hour, 43.7 minutes, i.e., 7.5 minutes more than the initial period of the first satellite. Its maximum distance from the surface of the Earth amounted to 1,700 km (about 1,060 miles), or 800 km higher than the first satellite.

Russia's Prodigious Helicopter—

HAD there been no other aeronautical revelations from the Soviet Union in recent days the Mi-6 helicopter would alone have made news everywhere.

The designation Mi-6 indicates that it emanates from the design bureau of Mikhail Milla, and in several respects (notably the geometry of the rear fuselage and tail boom) it resembles its smaller predecessors. The five-blade rotor is reminiscent of that of the Sikorsky S-56 and, together with its propulsion machinery, clearly forms a self-contained unit to which could be attached a variety of fuselages or structures suitable for "flying crane" applications. Details of the powerplants are not available, but the turbines appear to be of the 4,000 h.p. Kuznetzov type, presumably redesigned so that they can drive output shafts at the rear end. The engines are apparently coupled to a common gearbox provided with clutches and free-wheels giving a final shaft drive to the hub of the rotor. The photograph shows what appear to be an intake for the oil coolers between the main engine intakes; bifurcated outlets for the out-turned exhaust trunks; and an intake ahead of the rotor hub serving the gearbox oil coolers.

All this indicates that the Mi-6 is identical in configuration with the Westland Westminster (two Napier Elands); but it is rather larger than the British machine and it is also many months earlier in timing. It is a very remarkable achievement to have designed, developed and flown the Mi-6 and to have brought it to a state of development where it can gain a world record under observed conditions. The previous load-to-height record was 6,010 kg (13,250 lb) which a Sikorsky S-56 lifted to 6,560ft. On October 30 the Mi-6 flew to 7,874ft with a commercial load of 12,004 kg (26,464 lb). An accompanying Soviet announcement stated that the Mi-6 can carry 70 to 80 passengers as well as heavy equipment and vehicles; it was claimed that series production was "about to start."

—and Airliner

IN last week's special Commercial Aircraft issue of *Flight* we recorded that the Tupolev Rossiya—the name which has been unofficially ascribed to the Tu-114—should now be almost ready to fly. There was no confirmation as we went to press that this

THE Mi-6 — Russia's massive new twin-turbine helicopter which, as recorded on this page, has set up a new world record by lifting a load of 26,464 lb to a height of 7,874ft.

THE TU-114—Russia's challenging new swept-wing, four-turboprop, 120/220-seater airliner (see news item on this page).

event had in fact taken place: but the Russians have released a photograph and a few details.

The picture confirms reports that the wing and turboprop powerplant of this transport are based on those of the Bear bomber. No speed or range figures are quoted by the Russians, whose announcement stresses the "railway fare" economy of the aircraft, and the fact that it can seat 120 on "intercontinental" flights and up to 220 on "medium stages of about 850 miles." Non-stop flights between Moscow and Vladivostok, about 4,000 st. m., are said to be possible.

Cruising speed has previously been quoted by Russian sources as "about 550 m.p.h." If this is in fact correct, cruising propeller tip-speed and noise will be very great, notwithstanding the surprisingly small apparent diameter of the counter-rotating propellers.

It is the choice of propulsion which makes the Tu-114 so interesting. The aircraft is in the same transport class as the big American jets, and there will be many turboprop enthusiasts in the West who will be very keen to know Aeroflot's estimated roubles per mile for their new aircraft.

Fairey Results

A FINANCIAL statement issued in advance of the Fairey annual general meeting on November 21 shows that the group net profit attributable to the holding company after provision for taxation was £993,157 for the year ended March 31, 1957. The comparable figure for the previous year was £898,322.

Lord Weeks Clears the Air

AT a luncheon given by the Air League of the British Empire at the Mansion House, London, on Monday, the principal speech was made by Lt-Gen. Lord Weeks of Ryton. His address was described by Lord Sempill, who proposed the speaker's health, as "a brilliant address, both informed and courageous."

Lord Weeks began by saying that having been connected with one of the big "and at the moment successful" aircraft companies for more than twelve years [he is a director of Vickers, Ltd., the parent company of Vickers-Armstrongs (Aircraft), Ltd.] it was inevitable that his comments had bias. He said: "It is most unfortunate that the industry has got to conduct its affairs in the full glare of public opinion. . . . Some of the things which have been said do serious damage to our prestige abroad and can jeopardize our ability to sell."

He added: "Nothing is more dangerous than prophecies by Ministers and others on technical matters, and one of the first rules for an airline operator should be not to enter into public controversy with his supplier."

On the subject of the Government White Paper on Defence Lord Weeks said: "The aircraft industry cannot exist in a competitive world without adequate funds being allocated for research and development. I do not know what can defeat a low-flying supersonic bomber, so I hope a reprieve may be possible."

The speaker continued: "The United States aircraft industry in 1956 was the largest employer of labour of any manufacturing industry in the U.S.A. and it operates on the back of enormous government orders. The total output of civil aircraft in 1956 was only about one-eighth of the total turnover and civil aircraft are bought in large numbers by the military. . . . It is also very unfortunate that the financial position of world airlines—partly due to the fact that no one has the guts to raise the fares—is deteriorating at a time when they must find enormous amounts of new capital to finance the new jet age."

Of the immediate problems of the industry Lord Weeks said it was "faced with a variety of courses in the light of the impossibility of maintaining in their entirety all the units which make up its present structure." The first and proper course could be amalgamation, which could involve grouping and/or absorption. . . . It should apply to engine makers as well, and he had a feeling that an aircraft constructor should not be an engine constructor. A second alternative was a sort of half-way house by which a combination of companies could get together to carry out a project; and the third alternative was nationalization . . . this would be a most ghastly one.

The industry had got to get on quickly with some form of rationalization. It could not do it entirely on its own, the Government had to play ball as well—first by really doing something about Transport Command instead of paying annual lip-service to it.

Presiding at the luncheon was the Lord Mayor of London, Colonel Sir Cullum Welch. Air Chief Marshal Sir Guy Garrod, deputy-president of the Air League, proposed the health of the Lord Mayor and of the Corporation of London and the Sheriffs.

Lord Weeks's speech will be reported fully next week.

Westland Prospects

IN his statement to Westland shareholders, issued in advance of the annual general meeting (November 20) the chairman (Mr. Eric Mensforth) remarks that the potential contribution of the helicopter to passenger and freight transportation in densely populated areas had not yet been fully grasped in this country. He believes it only awaits the coming of such an economic twin-engined helicopter as the Westminster for this to be amply demonstrated. The loss this year of the London South Bank helicopter site is, he remarks, a severe blow, and a replacement must be found. Tests of the "flying crane" prototype of the Westminster should begin next spring.

Reviewing the activities of Normalair, Ltd., the chairman discloses that a contract has been received for a "complete system installation for the new naval strike aircraft" [Blackburn N.A.39 —Ed.]. Work has also been obtained in the guided-missile field.

Gianni Caproni

IT is with regret that we record the death of the Italian pioneer aircraft designer, Count Gianni Caproni, in Rome last week. Born at Massone d'Arco, near Trento, in 1886, he is probably best remembered for the "giant" aeroplanes of his earlier years and for the Caproni-Campini C.C.1 and C.C.2, which were the world's first jet-propelled aircraft to fly.

Caproni studied civil engineering in Munich, electrical engineering in Liege, and aeronautics at Paris. His first aircraft, a biplane, flew in 1910, and it was followed by a long line of large bomber and other aircraft. During 1912 and 1913 his first monoplane achieved a series of speed and distance records, and in 1914 he produced the first three-engined biplane to be used as a bomber aircraft. By 1919 he had built a 30-passenger triplane incorporating cellular construction and powered by three engines totalling 1,000 h.p.; but a projected 100-passenger machine had been abandoned.

In 1930 the largest bomber in existence was the Caproni Ca. 90P.B, powered by six 1,000 h.p. engines. World height records were established in 1937 and 1938 by Lt-Col. Mario Pezzi in Caproni Ca. 161 biplanes. It was the first flight of the Caproni-Campini C.C.1 in August 1940, however, that ensured for the name of Caproni a significant place in the history of aviation. This was the first aircraft to fly by jet propulsion (although not powered by a true turbojet engine: a conventional radial was used to drive the axial compressor). It was followed by the larger C.C.2 which, in December 1941, made a much-publicized flight from Milan to Rome.

The Caproni organization embraced a large group of member companies prior to the liquidation of the parent company in 1950. One of these subsidiaries, Aero Caproni Trento, continued in existence to produce the Caproni F.5 jet trainer, which—powered by a Turboméca Palas and designed by Ing. Stelio Frati—first flew in May, 1952. This was the last aircraft to bear the Caproni name.

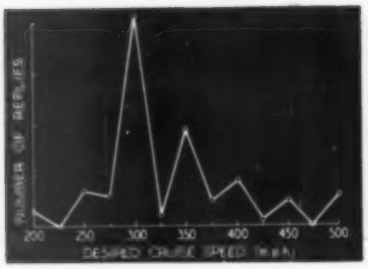


Fig. 1

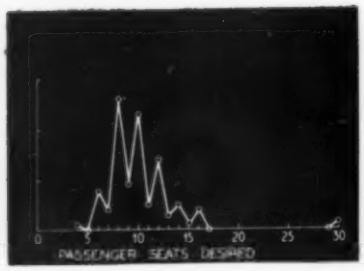


Fig. 2

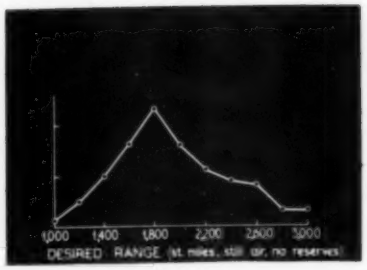


Fig. 3

Commercial Market Survey 1

The Business Aircraft Market

WITH the exceptions of Vickers and Aviation Traders, British industry has so far produced no turbine contender for the world's biggest civil aircraft market—that of American business aviation. Today, U.S. executives operate about 20,000 aircraft, of which about 1,000 are "heavy twins." Ten years hence they will be operating perhaps 2,000 heavy twins, many of them turboprop or turbojet powered. This represents big aircraft business; and the most favoured American contenders are the Lockheed JetStar, the Grumman Gulfstream and—in a larger class—the Fairchild Friendship. All these aircraft, incidentally, are to be British-powered. Here is Grumman's assessment of the market, as prepared for them by Donald A. Imgram and Peter E. Viemeister of Viemeister Associates, Inc., the New York firm of technical consultants. Details of the Gulfstream appeared in "Flight's" special Business and Touring Aircraft issue of October 11, 1957.

THIS survey, taken of 278 business operators of "heavy" twin-engined aircraft (DC-3s, Lodestars, Convairs, and so on) is perhaps the most detailed yet carried out in connection with an aeroplane intended solely for business use. Results were therefore closely guarded secrets for many months. With the Grumman 159 Gulfstream (two Rolls-Royce Dart 529s) now well along in the development stage, permission has been granted to publish details of the survey. It is interesting in that a large majority of those who responded expressed a preference for an aeroplane in the turboprop speed range, rather than for an aeroplane with a higher speed capability which can be realized only with a turbojet engine.

American business aviation received a strong impetus in the early post-war years when numerous DC-3s, Twin Beeches and Lodestars were made available by the armed services. These aircraft were eagerly purchased by many companies, anxious not only to gain prestige by owning corporate aeroplanes, but—more important—to speed personnel to conferences more quickly than could be done by other means. In this respect corporate aircraft proved eminently successful and enough executive time was saved to justify abundantly the cost of operating a private aircraft.

Company aircraft are today such an accepted part of the nation's transportation system that over 20,000 are currently in use in the United States, compared with the 1,700 aircraft now in airline service in that country. Business flying activities continue to expand each year, prompting the Civil Aeronautics Administration to predict that business flying would nearly double the number of hours being flown by 1965. Taken literally, these figures suggest that over 10,000* new aircraft will have to be built within the span of seven short years.

No manufacturer can afford to overlook such a potentially large market and most manufacturers are now actively engaged in the design or construction of aeroplanes for business use. The market for business aircraft can thus be expected to be highly competitive, with each manufacturer wishing to be certain that the aircraft he produces is exactly what the public wants.

Grumman Aircraft, whose Mallards, G-21s and Widgeons already serve a number of corporations, decided some time ago to re-enter the business aircraft field, a market they had vacated during the Korean War to concentrate on military aircraft production. A team of preliminary design engineers was assigned to full-time work on the project, assisted by the commercial sales office. The latter group supplied most of the background knowledge on the needs and desires of the business world, while the engineers provided the necessary experience in designing and producing a modern high-speed aircraft.

It was soon established that the most promising market for Grumman, with their type of constructional experience and production facilities, would be that now being served by the "heavy twins."

Certain characteristics of the "replacement" aeroplane are generally well known to the industry, having been the subject of much discussion during the past decade. In any development programme, however, numerous questions arise as to customer preferences for such detailed items as desired headroom, runway length, cruising speed, seating capacity and so on. These questions can be answered only by obtaining the opinions of a large number of prospective customers. A market survey was indicated.

In the early stages of a design project, aircraft manufacturers impose rigid security restrictions on the release of information pertaining to the project. Even the existence of a project is sometimes denied. This news blackout prevents competitors from finding out what projects are under active consideration, and also prevents the premature release of data which have not yet been finalized. More than one manufacturer has been embarrassed to find that after preliminary sketches have received widespread publicity, a design must be radically changed to reflect the results of further analysis and wind tunnel studies. For these reasons Grumman chose to utilize the services of Viemeister Associates, Inc., of Lindenhurst, New York, an outside technical service organization, to conduct an anonymous market research study.

Early in 1957, detailed questionnaires were forwarded to 278 operators of heavy twin-engined executive aircraft. Not all prospective customers of the Gulfstream, of course, now operate this type of aircraft, but the people who do so are the most qualified to state their preferences for a replacement aeroplane.

Of the 278 surveys sent out, 124 returns, or 44.6 per cent of the original mailing list, were filled in and returned. This remarkably high percentage return for a comprehensive questionnaire is perhaps indicative of the enthusiasm with which the business aviation world awaits the development of an aeroplane intended solely for its use. The 124 respondents now operate 241 aeroplanes, of which

**The Curtis Report predicted 60,000 U.S. business aircraft by 1975.*

About 80 per cent of the "heavy twins" in American business use today are Lodestars (on the left is a Learstar 2 conversion) and DC-3s. Respective numbers, as supplied by the A.O.P.A., are 260 Lodestars (including 14 Learstars) and 478 DC-3s.

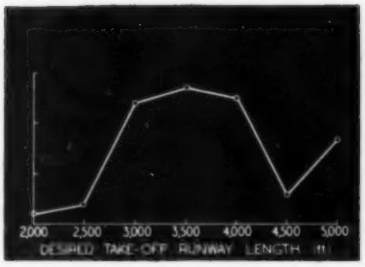


Fig. 4

Subject of the survey: the Grumman Gulfstream.

182 are of 600 or more horse-power. These include 60 DC-3s, 45 Lockheeds (Lodestars, Learstars, Venturas, Super Venturas) and 59 Twin Beeches. Only one of the respondents requested a helicopter in preference to a new fixed-wing aeroplane.

The survey questionnaires were divided into two parts: Part 1, the extent of flying activities now being performed with existing aeroplanes; and Part 2, the aeroplane characteristics most desired. The results of Part 1 are briefly summarized below in tabular form:

	Range of Answers	*Mean*
Annual utilization, hr	250-1,000	596
Number of passengers per trip... ...		4.03
Length of trip, miles	50-2,400	628
Typical cruising speed, m.p.h.	180-300	
Typical cruising altitude, ft	4,000-15,000	7,900
Percentage of trips on I.F.R.	5-95 per cent	42.4 per cent
Typical fuel reserves	10-65 per cent	21.9 per cent
Runway size of home airport, ft ...	3,000-12,500	5,880
Smallest runway visited	1,500-4,500	3,230

A more detailed breakdown of the replies of the DC-3, Lockheed and Twin Beech operators is included below.

Part 2 of the survey concerned the specifications for a new transport in the C.A.R. 4b category, to be available in early 1958. The results of the survey are plotted in Figures 1 to 4.

Figure 1 presents the cruising speed requested by the respondents. Contrary to popular belief, the survey indicates that a majority of operators prefer a speed range which can be most efficiently realized through the use of a turboprop engine. Evidently the jet-powered aeroplane is still a few years away in most minds.

Figure 2 summarizes the results of a question concerning the number of seats desired. Most of those who replied would be satisfied with ten, but few would be happy with less than eight.

Desired range is shown in Figure 3. This figure has been plotted on an ultimate range basis (no fuel reserve), since the replies expressed a wide divergence of opinion on fuel reserve requirements. Only a few people are looking for an aeroplane with coast-to-coast capabilities.

Figure 4 depicts the desired runway length, based on C.A.A. requirements. Most responses fell within the 3,000-4,000-ft runway class, but a few operators who are based at metropolitan airports thought that a 5,000ft capability would be satisfactory.

Baggage allowance requirements per passenger varied between 20 lb and 250 lb, with the most typical reply being 50 lb. Regarding number of engines, two were favoured in preference to four by an eight-to-one ratio.

Replies favoured a low-wing design by a three-to-one ratio over the proponents of a high-wing design. Over 90 per cent of the writers wanted stand-up headroom; approximately the same percentage wanted weather radar. Nearly everyone demanded de-icing, a few people specifying thermal de-icing. Several people requested heated windshields. Only one person asked for JATO. About half the respondents wanted an autopilot. Ten people included a request for an approach coupler. A lesser number requested an integrated flight system. Several requested dual instruments and dual communications gear. Others asked for collision warning radar. Built-in loading stairs were also requested by a number of people. Other questions concerned desired gross weight and price (the Gulfstream is now quoted as $700,000).

The survey thus brought to light a number of comments which could not otherwise have been obtained, and in several instances the Gulfstream was revised to accommodate customer preferences.

U.S. BUSINESS AIRCRAFT: SUMMARY OF 1956 OPERATIONS

	DC-3 operators		Lockheed operators		Twin Beech operators	
	Spread	Mean	Spread	Mean	Spread	Mean
Number of aircraft reported	60		45		59	
Annual utilization (hr) ...	300-1,000	637	300-1,000	545	250-800	589
Average number of passengers		6.6		4.4		2.7
Average trip length (miles)...		620		908		427
Cruise power, per cent ...	50-68	57.5	Lodestar	56	55-70	62
			Learstar	56		
			Ventura	61		
			Super Ventura	60.5		
Cruising speed, m.p.h. ...		190	Lodestar	211		182
			Learstar	277		
			Ventura	274		
			Super Ventura	300		
Cruising altitude, ft	5,000-15,000	8,200	Lodestar	8,750	4,000-10,000	7,600
			Learstar	9,600		
			Ventura and Super Ventura	9,800		
Fuel reserve, per cent ...	12.5-40	21	10-40	20.6	15-65	24
Home runway, ft	3,000-12,500	6,180	3,500-10,000	5,900	3,000-10,000	5,500
Shortest runway visited, ft ...	1,500-4,000	2,900	2,200-4,500	3,150	1,500-4,000	2,520
Percentage of flights I.F.R. ...	5-95	46	5-95	40	10-90	40

Operators were also asked to indicate the percentage of costs for certain items:

	DC-3 Mean	Lodestar Mean	Learstar Mean	Ventura Mean	Super Ventura Mean	Beech Mean
Crew salaries	29.8	28.6	32.8	34.1	40.8	33.0
Maintenance	28.7	36.9	27.9	23.2	25.1	29.9
Fuel and oil	27.5	27.2	19.7	19.9	21.5	26.6
Miscellaneous	14.0	7.3	19.6	22.8	12.6	10.5
per cent						
*Total, per cent	100.0	100.0	100.0	100.0	100.0	100.0

*Excluding depreciation and insurance.

Air Cargo—

The Next Decade

Typifying today's air freighting business is this Slick Airways DC-6A.

Stanley H. Brewer

WE reproduce here a synopsis of a comprehensive 120-page document* prepared for the Boeing Airplane Company by Professor Stanley H. Brewer, Professor of Transportation at the University of Washington. It is concerned with the U.S. domestic freight market, which is perhaps the best-documented in the world, and it sets out certain basic principles applicable to the great untapped air freight market as a whole.

BUSINESS has been so good for the airlines that little effort has been expended in exploring possibilities that now exist in air cargo transport. This is not meant to be disparaging, because the airlines have done a superior job in handling the ever-increasing amount of passengers and other business that has been coming to them.

As a result of rapid growth patterns, a strange sort of priority system has evolved around the economics of traffic carried by the airlines. Because the passenger is thought of as producing approximately fifty cents per ton-mile in revenue he is given a high priority. The least profitable business in the airline industry has been the movement of freight, but with more modern airplanes even this business has begun to be attractive to the carriers.

The economic characteristics of the airplane are changing very rapidly. Using indirect costs reported to the Civil Aeronautics Board by the airlines in their annual reports, it can be shown that the operation of DC-3s, C-46s and DC-4s is an expensive venture for the cargo carrier. Use of the newer DC-6As shows promise of profits, and utilization of the 1049Hs now being delivered should show an even more healthy return.

The statistical data on air cargo for the past ten years are misleading and give a forecaster little data on which to base a trend line for purposes of projection. Without knowledge of what has gone on in this early period of experimentation in air cargo, students of the historical data become convinced that the future holds little promise. The terminology used does not always indicate precisely what writers and forecasters have in mind when terms such as air freight and air cargo are used. The Civil Aeronautics Administration definition of air cargo includes commercial air express and air freight. It does not include air mail or personal baggage.

Air cargo volume has risen more than fourfold in the past decade, but the growth pattern is spotty and appears unhealthy. The statistics of American Airlines and Flying Tiger are typical of the airline industry. The more one looks at the revenue accounts and their percentage relationships to total operating revenue for the years 1947 to 1955, the more convinced one becomes that little relationship can be based on averages; certainly any such data used to develop trends should be subjected to very careful scrutiny.

Very few of the trunk line passenger carriers have displayed any great amount of interest in air cargo. There are many reasons for this, but they boil down to questions of relative profitability. High demand for passenger transportation has made certificated carriers reluctant to schedule stops and turn-around schedules to allow any great amount of time for loading and unloading freight. There has been pressure to utilize the equipment as fully as possible in passenger operations. High peak demand for passenger movements has meant off-loading or delays for freight and resulting unreliability in delivery schedules. With other traffic more profitable than freight, the outlook for the air cargo industry is viewed with a great deal of pessimism by many students of the subject.

With the fleets of the all-cargo carriers still largely made up of C-46s and DC-4s, our national policy has been to tie minimum air freight rates to what the Board called "attainable costs" of operation of the least efficient aircraft. This economic felony is further compounded when the all-cargo carriers lease or charter their more modern aircraft, leaving only the older outmoded equipment in the rate-protected domestic air cargo market. The rates cannot and will not come down as long as this kind of equipment is dominant in air cargo transportation and as long as the Civil Aeronautics Board insists on minimum rates that will cover out-of-pocket costs for operating these airplanes.

Freight is the stepchild of the passenger carriers. Air freight transportation is not given major consideration in management thinking in this industry. As long as this attitude prevails, the older equipment of the trunk line carriers is the only kind that will be relegated to all-cargo schedules. Very few new aircraft have been purchased by the passenger operators for the purpose of moving freight. Most of the freight carried by these companies is moved in the baggage compartments of passenger planes. The companies with all-freight schedules have utilized DC-4s for the most part. Very few craft of the DC-6 vintage are being used for this purpose, although they may see service in this capacity soon. In that event, air freight rate-making will once again be tied to obsolete aircraft.

Many people feel that the increased cargo-carrying capacity of the new turbine-powered passenger airplanes now on order will take care of a large part of the air cargo potential. Certainly this must be considered, but not as seriously as it has been by numerous writers and analysts. There are too many other factors that will more than overbalance this as negative factors in the development of all cargo services.

A Matter of Priorities

The most profitable business with the highest priority will be moved first. This will, of course, mean mail, excess baggage, and express. The nine-ton gross capacity of the cargo compartments of the passenger-carrying Boeing 707 would seem to be quite a bit, but the increased number of passengers will mean more baggage. Forty pounds of baggage for each of the 120 passengers will require 4,800 lb of the 18,000 lb capacity. However, increased mail, excess baggage and express will utilize much of this capacity. Loading time and package size limitations will further reduce the air freight capacity of the new jet aircraft. The airlines will oppose increases in baggage allowances (at present 40 lb), since excess baggage is the highest ton-mile of revenue item they carry (65/70 cents per ton mile).

When the index system of measurement is used, rates of growth in air cargo ton-miles have been greater for the past ten years for all certificated air carriers and even greater than the rate of growth of air passenger miles. But aircraft manufacturers have expressed little confidence in the future of air cargo development. They continue to "place a box on the back of the passenger car." There is yet to be developed a properly designed commercial cargo-carrying airplane. The freight aircraft that have been produced have been developed only to squeeze the last ounce of engineering cost out of airplanes which were produced for passenger runs. The DC-6A was the last of the DC-6 series. The 1049H is being brought out at the end of the Constellation series and it has been announced that Douglas will squeeze a few cargo airplanes out of the end of the DC-7 line. [The Tyne DC-7D is an example.]

**"Air Cargo—The Next 10 Years": Boeing Airplane Company Transport Division, Renton, Washington. Ref. S-56, September 17, 1957.*

Very little has been done by the aircraft manufacturers to engineer better and faster loading and unloading of cargo airplanes. The airplane is one of the few vehicles of transportation that has not been able to separate its carrying unit from its power unit so that the expensive machinery of the motive unit can be utilized to a maximum degree. This is important since the operators cannot make money while their airplanes are sitting on the ground. Ways must be devised to keep them moving. Facilitating the loading and unloading of cargoes is a major problem. It can and will be done by some manufacturer. That manufacturer will force the operators to buy his product, because they will have an advantage over their competitors.

In order to attract customers to the airlines, a setting of luxury has been developed for the passenger. Many people have an adverse reaction to this. They feel that all this extra service and comfort must be expensive. The speed of air freight movement compared to other modes creates the same illusion. The traffic manager is trained to use air transportation for freight movement only in cases of emergency. This thinking can and must be overcome. The small shipper, without a trained traffic manager, places a great deal of reliance on average figures to develop his attitudes. He notes, for example, that average rail rates are 1.4 cents per ton-mile, motor-truck rates average more than 6 cents per ton-mile, and air freight rates are more than 20 cents per ton-mile.

The Trend of Rates

Rates of surface carriers have been constantly increasing over the past ten years. Air freight rates have declined in relation to rail and motor carrier charges. Indications are that the price of these forms of transportation is coming together despite the shortage of aircraft and the policy of tying minimum air freight rates to operational costs of uneconomical aircraft. Aircraft manufacturers should take a cue from other transportation equipment reducers and devote substantial budgets to advertising the service that is and can be provided by their airline customers.

Much attention has been given by a few to the many benefits of the rapid and reliable transportation services that can be performed by the airlines in moving property. The military has a large-scale experiment under way in Europe called Operation Mass. Mass significantly stands for "Modern Army Supply System." The object of this new system is to provide maximum service with a minimum of stock. This stockage principle will reduce the number of repair parts now held in European depots for support of the Seventh Army from 400,000 line items to 51,640 line items. By maintaining minimum stocks in the immediate area of use and the majority of the parts in the United States, and by flying minimum inventory replacements to the depots, inventories are cut substantially. Ultimate reduction in total purchase will result from utilization of needed equipment only and elimination of waste due to technological obsolescence. Ultimately the Army's experiment is to be expanded to almost all items of usage by the military.

By sidestepping the warehousing function and eliminating the necessity for having large sums of capital tied up in inventory at considerable interest cost, total outlays for each unit as it goes into assembly line might be reduced. This thinking is being given more and more consideration by the many consumers of products that must be moved substantial distances from their point of production.

Relationship with National Product

There is a remarkable correlation between Gross National Product and the consumption of intercity ton-miles of transportation. Over the years, however, there has been a considerable redistribution of the total ton-miles among the several agencies that are competing for the business. Throughout history, whenever a faster or more economical method of transportation has been developed, considerable tonnage has shifted from the slower or less economical means. Speed and economy do not necessarily go together. As a matter of fact, they may have an opposing effect on the demand for freight transportation.

From the forecast of Gross National Product and population, using 1956 *per capita* consumption pattern of air cargo transportation as a basis, a forecast for the period 1957 to 1965 has been made.

Starting with the *per capita* consumption of 2.38 tons of air freight moved within the continental limits of the United States for the year 1956, increases of 15, 20 and 25 per cent per year have been applied. The 15 per cent growth pattern is thought to be extremely conservative in view of growth patterns previously shown. As surface transportation costs move up and air costs of moving freight decline, growth patterns will surely accelerate. If, however, known patterns are used for what are considered to be normal years (nonwar years), an annual growth factor of 21.52 per cent is arrived at. Applying this to the period 1957-1965, the resulting forecast is 931 million ton-miles for 1960 and 2,662 million ton-miles for 1965. These are the figures for air cargo transportation for the domestic United States only. Using the *per capita* consumption of air cargo derived from the total

Being loaded at New York La Guardia with a cargo shipment for Los Angeles is this American Airlines DC-6A.

movement of all U.S. carriers, a different pattern emerges. All U.S. carriers (except Logair) moved about 567 million ton-miles of cargo in 1956. The *per capita* air cargo consumption based on this figure is 3.37 ton-miles. Using this as a base and again showing annual increases of 15, 20 and 25 per cent for 1957-1965, the 1965 estimate varies from 1,618 million to 4,853 million ton-miles. The 15 per cent growth pattern is again considered to be too low to be realistic, and a forecast of 20 to 25 per cent seems more accurate. For 1961 all U.S. carriers will move an estimated 1,525 million to 1,871 million ton-miles of air cargo. For 1965 the estimate is from 3,360 million to 4,853 million ton-miles. A rate of growth of 22.5 per cent per year would develop about 1,680 million ton-miles for 1961 and 4,050 million ton-miles for all U.S. carriers in 1965.

Summary and Conclusions

Uneconomic, technologically obsolete aircraft that were originally manufactured primarily for the transportation of passengers or military personnel have been used most extensively for the movement of air cargo. The cargo has also been transported to a large extent in baggage compartments of passenger-carrying airplanes. Loading and unloading methods are costly and antiquated. Efficient terminals for the handling of the freight moved in airplanes are virtually non-existent. Since the outbreak of the Korean War, there has been a shortage of nearly all kinds of commercial airplanes. Many available aircraft have been used in military airlifts and other charter operations. These conditions have all held back development of the commercial air cargo market.

In spite of these handicaps, a healthy growth pattern is seen. By eliminating the four Korean War years, when the Pacific airlift was being operated, the statistical data shows a growth rate of 21.52 per cent per year. There is no reason to believe that the growth for the future will be any less than this.

There is very good correlation between intercity ton-miles moved by all forms of transportation and Gross National Product. Intercity ton-miles of freight moved are also tied to population data.

By using the usually reliable projection of Gross National Product and population for the next ten years, it is possible to determine the total amount of freight ton-miles that will be moved by all of the agencies of transportation for each year of the coming decade.

Distribution of this total tonnage among the several competing agencies for each of the years can only be estimated. Past trends indicate a definite shift of much of the tonnage between carriers. High-value merchandise freight, which demands good service and will stand higher than average freight rates, has been diverted from rail to motor carrier transportation. Much of this tonnage will be carried in aircraft in the future. Freight forwarders continue to move nearly 5,000 million ton-miles of freight in excess of 400 miles each year. Some of this tonnage will move as air cargo as soon as air freight schedules become reliable and shippers become confident that the advertised transit times can be relied upon.

Surface rates on small shipments have been increased approximately five per cent in the past year. Another 20 per cent increase is being requested and preliminary proceedings have almost been completed by the Interstate Commerce Commission. These surface rates have more than doubled in the last decade and there is no indication that motor carrier and rail rates will remain static in the future.

In calculating ton-mile rates by air and surface, a mileage differential must be used because of the more direct routes travelled by air carriers. This differential averages 20 per cent for motor carriers and 25 per cent for rail carriers on operations in excess of 400 miles.

Based on past trends and known developments in what might be termed normal years and projections of economic data by the most reliable forecasters, the air cargo development of the next ten years will be substantial. It is estimated that domestic movements of air freight and express will be approximately 1,100 million ton-miles for the United States in 1961, and for 1965 this tonnage will be about 2,700 million ton-miles. More than 65,000 million ton-miles of small shipment freight will be moved for distances in excess of 400 miles at rates exceeding 6 cents per ton-mile by rail freight forwarder, motor common carrier and rail less-than-carload in 1965. For 1955 these carriers moved 43,000 million ton-miles of this same kind of freight on hauls over 400 miles at rates of 6 cents per ton-mile or higher. The air tonnage was nearly 1 per cent of this total in 1955; for 1965 the air carriers will move 4 per cent of the tonnage in these categories.

The development of more efficient terminals, larger volume movements with resultant unit cost economies and the manufacture of aircraft specifically designed for air freight movements will accelerate these rates of growth beyond 1965.

VISITING staff and students from the R.A.F. College, Andover, seen recently at the works of Armstrong Siddeley (Brockworth), Ltd., Gloucester. With the party are A. Cdre. D. W. Lane, Commandant of the College, and G/C. C. H. Simpson, Assistant Commandant. The students include officers from the R.A.F. and Air Forces of the U.S.A., Finland, Pakistan, Portugal, Jordan, Germany, Italy, Indonesia, Burma and Thailand.

HERE AND THERE

High-level Exports

DURING the first nine months of this year, British aviation exports amounted to nearly £78.4m, the S.B.A.C. states. Of this total, aircraft and parts accounted for over £45m and aero-engines for almost £29m. The total of engine exports for the third quarter of 1957 was the highest quarterly figure ever achieved in this country.

Bastan-Beech

SUD-AVIATION announced on October 25 that two Turboméca Bastan turboprops are to be fitted to a Beech D-18S ("Twin Beech") which will start service as a test-bed next summer. The conversion will be effected by S.F.E.R.M.A. at Bordeaux-Merignac. The Bastan, a very neat unit of 750 h.p., was described in our world engine review issue of July 26 last.

Mitchell Memorial

BUILT in memory of R. J. Mitchell, designer of the Spitfire, the Mitchell Youth Centre at Hanley, Stoke-on-Trent, was opened by G/C. Douglas Bader on October 28. This project, together with the Mitchell scholarships at Southampton University, was financed by a fund started by the Lord Mayor of Stoke-on-Trent in 1943. Hanley was Mitchell's birthplace.

U.S. Spanish Bases

IN Spain the three bases built for the U.S. 16th Air Force—newest component of the Strategic Air Command—are now ready for use. Each of these American-built bases—Torrejon, Zaragoza and Moron—has facilities for a wing of B-47s plus two squadrons (one U.S.A.F. and one Spanish) and 20 refuelling tankers. The main runway at Torrejon—13,400ft in length—is said to be the longest in Europe.

Hungarian Air Ambulance

A NATIONAL air ambulance service has been started in Hungary, operating with three aircraft from Ferihegy Airfield, Budapest. It is claimed that they can get a patient to Budapest within an hour.

Vampire Variant

THE first of 68 Australian-built de Havilland Vampire Trainer 35s for the R.A.A.F. was handed over at the company's factory at Bankstown, N.S.W., recently. The Australian Minister for Supply, Mr. Howard Beale, took delivery on behalf of the Service.

Northern Pioneer

PILOT in the first round-trip flight between Liverpool and Manchester in 1911, Mr. Henry Greg Melly died in Great Crosby on October 28 at the age of 89. His Blériot monoplane took 40 and 63 minutes respectively for the out and return legs, which were made between Waterloo beach, Liverpool, and Trafford Park, Manchester.

Missile Award

AMONG recent awards made by the United States Army to civilian scientists for work in missile development was one to Dr. Wernher von Braun, who took a leading part in the development of the German V-2 weapon during the war and is director of the Development Operations Division at the U.S. Army Ballistic Missile Agency at Redstone Arsenal.

U.S. Target Missile

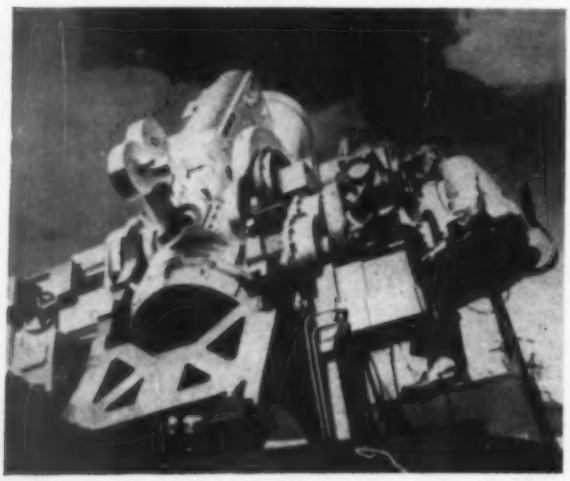
DESCRIBED as a new target missile, the Q-5—designed to test the effectiveness of U.S. supersonic weapons — is being developed by the Lockheed Aircraft Corporation. In the rôle of an "enemy" missile or aircraft attacking from a great height, the Q-5 would be instrumented to register near misses and theoretical hits without being destroyed and thus be recoverable.

Cool Assignment

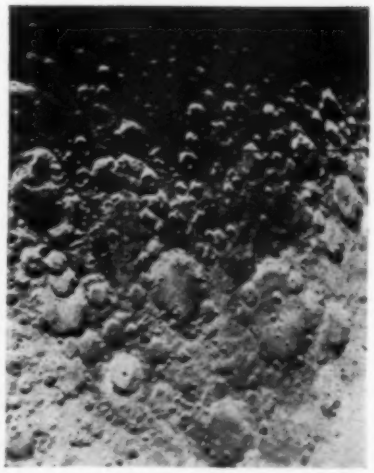
A WELL KNOWN war-time A.T.A. pilot and one of only four women to hold the full R.A.F. flying brevet, Mrs. Jackie Moggridge has joined Lec Refrigeration, Ltd., and is with their staff pilot Mr. George Farley on the company's current business trip to Africa (referred to in *Flight* for September 20, p. 492). Mrs. Moggridge is acting as co-pilot in the company's Anson 19.

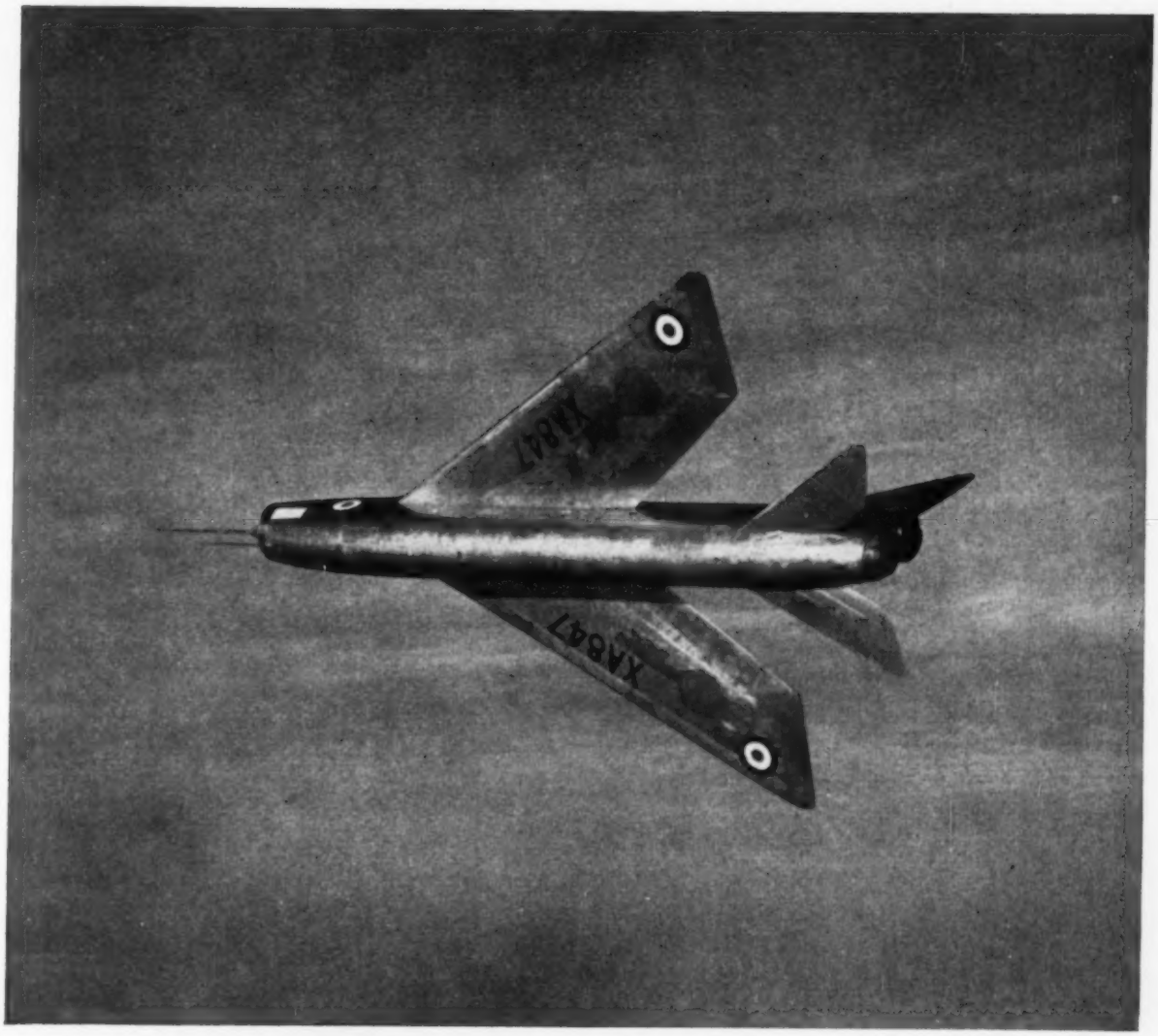
Vital Acoustics

AMONG subjects for discussion by the Acoustical Society of America, which held its 54th annual convention at the University of Michigan recently, were "the noise nuisance of jet engines" and "the problem of making oneself heard at crowded cocktail parties."



ROTI MARK 2 (recording optical tracking instrument) is the name of the imposing American device on the left. It weighs over eight tons and can photograph missiles at between 50 and 100 miles distant. At ten miles range it has pictured a C-118 (upper right); and as an instrument for lunar reconnaissance it produces such results as shown on the immediate right.





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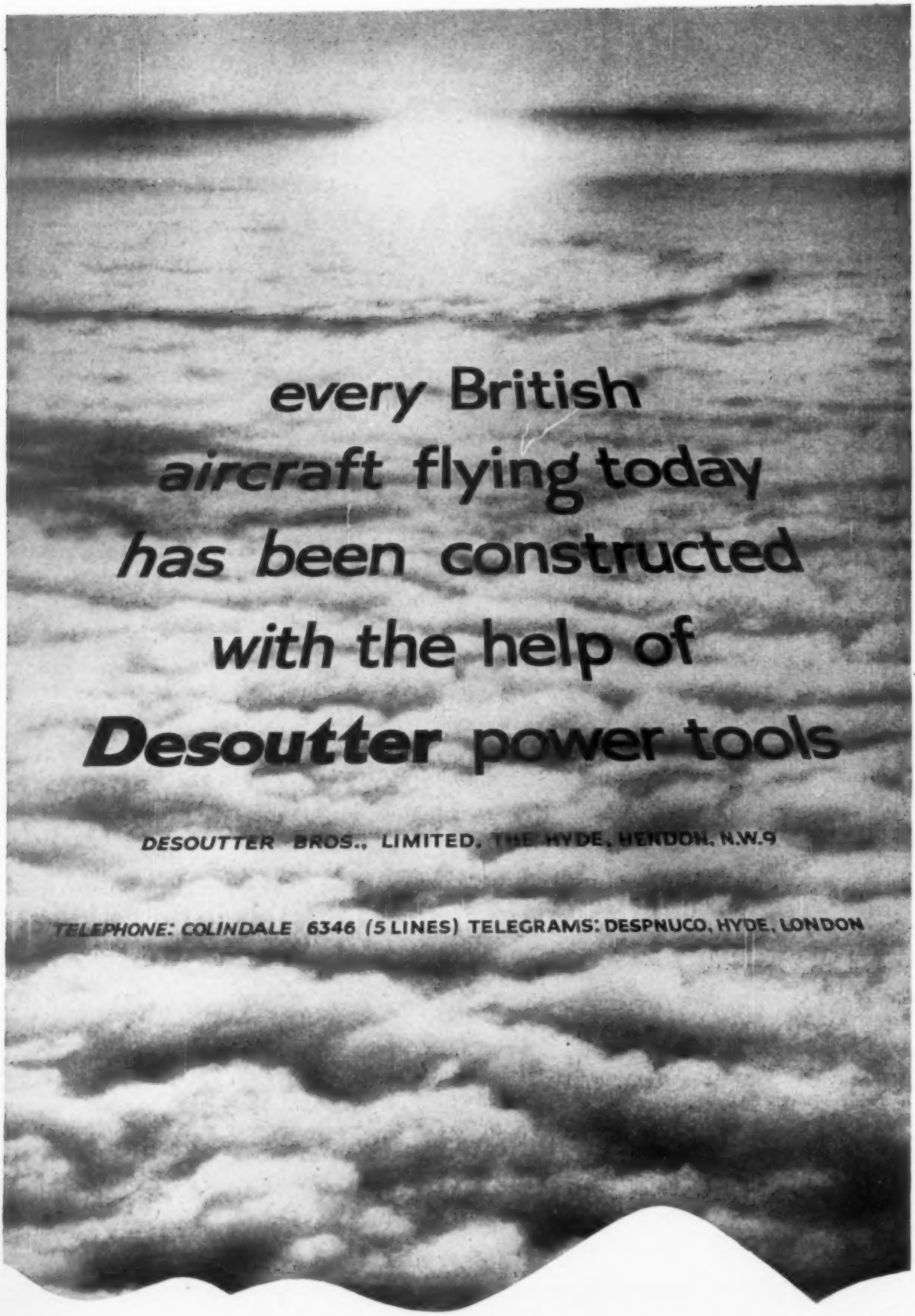
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A production Tabloid for the Royal Flying Corps. These aircraft were fitted with the 80 h.p. Gnôme engine.

The Sopwith Tabloid, Schneider and Baby

HISTORIC MILITARY AIRCRAFT No. 17 PART I By J. M. BRUCE, M.A.

WHEN Frederick Sigrist, M.B.E., F.R.Ae.S., died on December 10 last year his passing was sympathetically reported in the aeronautical press. The forward-looking generation of the present day may have read those warm appreciations with somewhat detached interest; but, for the relatively few who remember and others who care, such reports may have evoked memories of a chilly Saturday afternoon a little more than two wars ago.

On that day—November 29, 1913—more than 50,000 people had gathered at Hendon to watch the flying and particularly to see B. C. Hucks perform aerobatics (then a newer development in flying than supersonic flight is today). Those spectators saw an unexpected addition to the flying programme when a tiny biplane flew in from the west and made two circuits of the racing course at a speed of nearly 90 m.p.h. This aircraft was the new Sopwith two-seater, powered by an 80 h.p. Gnôme rotary engine.

The more knowledgeable members of the crowd at Hendon may have been discussing the excellent performance figures established by the Avro 504 when it underwent the official tests at Farnborough five days earlier. The profound impression made by the little Sopwith on its public début would have been enhanced had it been known that at Farnborough the same morning it had returned performance figures excelling even those of the Avro. With its load of pilot, passenger and fuel for two and a half hours, the Sopwith had a maximum speed of 92 m.p.h., stalled at 36.9 m.p.h., and climbed to 1,200ft in one minute. This speed range was very much better than that of any contemporary biplane, and indeed it was clear that the Sopwith was superior to any monoplane then in the United Kingdom.

Fred Sigrist had played an important part in designing the little Sopwith, as he had likewise in the case of the aircraft's predecessors, the first Bat Boat and the three-seater biplane. Apprenticed as a marine engineer, he had joined Mr. (now Sir) T. O. M. Sopwith in 1910 and was responsible for the maintenance of Mr. Sopwith's cars and motor boats. When Sopwith's interest turned to aircraft, Fred Sigrist's responsibilities increased, and with the refractory aero-engines of those heroic days he soon proved to have a way that approximated to genius.

On December 18, 1910, Mr. Sopwith had won the Baron de Forest prize with a 3½-hour flight in which he covered a distance of 177½ miles. His aircraft was a Howard Wright biplane powered by a 60 h.p. E.N.V. engine which had never functioned properly for longer than twelve minutes at a time. Behind locked doors Sigrist worked on the E.N.V. to such good purpose that it ran perfectly throughout the 3½ hours and would have continued to do so had not extreme turbulence in hilly country obliged Sopwith to land. Such was the man who was T. O. M. Sopwith's chief engineer. When the Sopwith Aviation Company was formed in 1912, Fred Sigrist became works manager of the factory that was established in a disused roller-skating rink in Canbury Park Road, Kingston-on-Thames.

Information supplied by Mr. Bruce Robertson and material lent by Mr. A. R. Weyl, A.F.R.Ae.S., A.F.I.A.S., F.B.I.S., has contributed substantially to this history, and the author wishes gratefully to acknowledge their assistance.

The little two-seater which startled the Hendon spectators in November 1913 had been designed more or less in secrecy. It was intended for racing and demonstration flying, and had a cleanness and economy of line which were remarkable for its day; it established a Sopwith tradition which was to have its most endearing echo in the delightful Pup of the war years.

Construction was of wood, with wire bracing and fabric covering. The fuselage was built as a box girder with a rounded top decking, and the forward portion was covered with sheet aluminium. The engine, an 80 h.p. Gnôme rotary, was almost wholly enclosed in a cowling of peculiar form. The front bearing of the fore-and-aft mounting was carried between two transverse spacers, above and below which were fitted domed cowlings; the upper cowling established the contour of the fuselage top decking, and the lower was cut away to expedite the escape of exhaust gases. In the narrow gap between the spacers were two small apertures which were the only inlets for cooling air. The Sopwith apparently suffered from none of the cooling difficulties which beset the bigger Gnôme of the later S.E.4.

The pilot and passenger were accommodated side-by-side: they could not have been very comfortable, for the fuselage was only 3ft 3in wide. The pilot occupied the left-hand seat. There was no windscreen, but the forward edge of the cockpit was raised and probably deflected the airstream somewhat. The undercarriage was a simple, twin-skid affair with the axle bound to the skids by rubber cord.

The single-bay wings spanned 25ft 6in, had slight stagger, and could be warped to provide lateral control. The external bracing consisted of stranded cables. The centre section was rigidly braced but there were, of course, no incidence wires between the interplane struts. The tail unit was of simple design, and the movable surfaces were made of steel tubing. The tailplane was braced by two small struts, and there was no fin. Empty, the little Sopwith weighed a mere 670 lb; with pilot and fuel for 3½ hours aboard it weighed 1,060 lb: the wing loading was a little over 4 lb/sq ft.

Few of the early aircraft manufacturers appeared to feel a need for naming their products: named aircraft were the exception rather than the rule, a fact which does nothing to aid the researches of the historian. In the case of the little Sopwith, however, the nickname "Tabloid" found early and universal acceptance among the aviation devotees of its day. In the history of the Sopwith Pup (*Flight*, January 1, 1954) it has been noted that the name Pup was made inseparable from that aircraft by official strictures ordering that the designation must in no circumstances be used. So it was with the Tabloid: a threatened law-suit for alleged misappropria-

THE SOPWITH TABLOID, SCHNEIDER AND BABY...

Right, the Tabloid prototype in its original form; and below, the same prototype after its return from Australia with fabric removed from rear fuselage and white rectangle painted on the rudder for an official R.N.A.S. serial number.

tion of a registered trade name served only to establish the name with perverse permanence.

The Tabloid's first test flights were made at Brooklands by Harry Hawker. When they were satisfactorily completed he flew the little biplane to Farnborough for the official tests, thence to Hendon. Hawker went to Australia early in 1914, taking the prototype Tabloid with him. He stayed in his native country for some months, giving demonstration flights, and returned to England on June 6. By that time his Tabloid presented a somewhat different appearance: a simple vee undercarriage had replaced the original skids, and the rear fuselage had been stripped of its fabric, allegedly to enhance the machine's looping capabilities.

During Hawker's absence the Tabloid had achieved spectacular international fame. The type had gone into production early in 1914, most of the aircraft being built for both wings of the Royal Flying Corps. On April 12, 1914, Harold Barnwell borrowed a Tabloid to attempt aerobatics. His first loop was unsuccessful; he landed to ask the spectators what had happened, took off again, and made three perfect ones at 3,000ft. He thereby became the first British pilot of the Brooklands fraternity to perform aerobatics. The machine Barnwell used must have been one of the earliest production Tabloids, and at least one other example of the type was in existence at that time.

This latter Tabloid was fitted with a float undercarriage and had been built to participate in the 1914 contest for the Schneider Trophy. On December 5, 1912, M. Jacques Schneider had announced his intention of presenting a trophy for an international seaplane contest, to be held annually. The trophy was handed over to the Aero Club de France early in 1913, and the first contest was held at Monaco on April 15 that year. It was won by a Deperdussin monoplane piloted by Marcel Prévost. Despite its big 160 h.p. Gnôme engine the Deperdussin's average speed was only 61 m.p.h., an average which was drastically reduced to 45.75 m.p.h. because the judges made Prévost repeat his last lap for failing to cross the finishing line correctly.

The Tabloid's startling accomplishments as a landplane held the promise of comparably good performance as a seaplane. Mr. Sopwith went personally to France to obtain one of the new 100 h.p. Gnôme Monosoupape engines for the racing machine. Its installation was similar to that of the 80 h.p. Gnôme in the original Tabloid, but the forward ends of the upper and lower longerons met in a point and were connected by a lozenge-shaped transverse member which held the front bearing. The lower portion of the engine remained uncowled.

The Tabloid seaplane originally had a single main float. The aircraft was assembled at Hamble, for it was intended to conduct its trials from the Hamble river. The pilot was C. Howard Pixton, who had just left the sick-bed to which he had been confined with a severe cold. He climbed into the Tabloid, the aircraft was pushed down the slipway into the water, and its engine was started. The handling party released the little seaplane, but when the engine was run up for taxying the Tabloid turned completely over and Pixton was thrown into the water. The Tabloid's inverted immersion lasted for several hours. It drifted out to midstream and some time elapsed before a rope could be got to it. Not until the tide changed in the early hours of the following morning was the aircraft retrieved.

The sodden, damaged structure was sent back to the Sopwith works. Not only did it have to be rebuilt in time to participate in the race on April 20, but the undercarriage obviously had to be considerably modified. Fred Sigrist worked night and day to restore the airframe to an airworthy condition, but time was too short to permit the complete re-design of the undercarriage. A more conventional arrangement was achieved by sawing the large main float along its centre-line, dividing it into halves. The inboard side of each half was filled in and two small pontoon-type floats were thus produced. Each float was attached to the fuselage by two struts; two cross-bars were fitted, and the whole structure was wire-braced. The tail unit incorporated a fixed fin, and a plain rudder was fitted. The flying wires were duplicated.

The rebuilt Tabloid seaplane was launched near Kingston Bridge on April 7, 1914. It was intended to fly it from the river above Teddington Lock, but officials of the Thames Conservancy Board objected and the aircraft had to be taken out of the water. It was ascertained that the Port of London Authority did not object to such trials being conducted from waters under its control, so the Tabloid was taken to Richmond next day. It was launched at Glovers Island, and Pixton made an uneventful take-off. Despite a slightly refractory engine he was able to establish that the aircraft handled well. It was therefore prepared for despatch to Monaco.

Mr. Sopwith went to Monaco personally to supervise the arrangements; with him he took Victor Mahl, who was responsible for tuning the engine. A trial flight on the eve of the Schneider contest revealed that the large-diameter, medium-pitch propeller was causing the engine to over-rev; a smaller Integral propeller of coarser pitch was therefore substituted. Other modifications included the fitting of an additional fuel tank beside the pilot's seat: the total fuel capacity was thereby increased to twelve gallons. The Tabloid had the racing number 3 in the contest.

The other competitors were three Nieuport monoplanes, flown by Espanet and Levasseur of France and C. T. Weymann of America; two Morane-Saulnier monoplanes (Lord Carbery, Great Britain, and Roland Garros, France); a Deperdussin monoplane (Thaw, America); an F.B.A. flying-boat (Burri, Switzerland) and a German entry, piloted by Stöffler. Stöffler and Lord Carbery wrecked their machines on the day preceding the race, but the latter borrowed a Deperdussin (160 h.p. Gnôme) from M. Janoir and, despite the fact that he had never flown an aircraft of that type before, made a sporting (but unsuccessful) attempt to participate in the race.

The course was a difficult one; each lap was ten kilometres (6¼ miles), but no leg was more than 2¾ miles in length (the shortest being a mere 260 yards), and the Cap Martin turn was of about 165 deg. Twenty-eight laps had to be flown, and each aircraft had to alight on the water twice in the course of its first lap as a proof of seaworthiness. The seaplanes did not race in the generally accepted sense of that term: the winner was the machine which covered the course in the shortest time.

First away were Levasseur and Espanet, punctually at 8 a.m., followed by Burri, whose porpoising F.B.A. became airborne after a series of alarming hops. Pixton took off at 8.16 a.m., crossing the starting line at full throttle after a take-off run of only 60ft. He gave clear notice of his Tabloid's capabilities in his first lap which, including the two compulsory descents on to the water, took only 4 min 27⅘ sec. His rivals' times were: Espanet, 8 min 55⅘ sec; Levasseur, 9 min 17 sec; Burri, 6 min 17⅘ sec.

The rest is history. The Tabloid traversed the course with machine-like regularity, drawing steadily ahead of the Nieuports and the F.B.A. At 50 km, Pixton's average speed was 88.9 m.p.h.; by 150 km it was 89.4 m.p.h. Espanet's engine failed at 160 km, and Levasseur also was obliged to land at the end of his seventeenth

lap. The Tabloid completed the 280 km in 2 hr 13⅘ sec, at an average speed of 85.5 m.p.h., completely eclipsing the performance of its sole surviving rival, Burri's F.B.A., which struggled on to complete the course in 3 hr 24 min 12 sec. Pixton did not alight immediately, however: opening up his engine to the full, he flew two more laps to complete a distance of 300 km, covered in 2 hr 9 min 10 sec. The average speed was 92 m.p.h., a world record for seaplanes.

The superiority of the Tabloid was so marked that Garros, Weymann and Thaw, realizing the impossibility of bettering Pixton's performance, did not take off.

The Tabloid's victory raised Britain's prestige immensely in the aeronautical field. In *The History of British Aviation, 1908-1914*, R. Dallas Brett wrote:—

"Hitherto the English pilots had been regarded with mild amusement whenever they had dared to compete with the French experts, and the English aircraft were frankly ridiculed in France. . . . It was abundantly clear that the combination of Howard Pixton and the Sopwith Tabloid was immeasurably superior to any other combination of pilot and seaplane on the continent of Europe. . . . It was . . . a portent of the dawning ascendancy of the British aircraft industry, . . . the most important event which had ever happened in the history of British aviation."

The victorious Tabloid was taken back to England, where it was fitted with a plain vee wheel undercarriage. In this landplane form its maximum speed was 105 m.p.h. Together with a standard 80 h.p. Tabloid it was entered for the 1914 Aerial Derby, which was to be flown off on May 23. Bad weather led to the postponement of the race until June 6, when eleven contestants took the air. The Schneider Tabloid, flown by Harold Barnwell, was last away; Howard Pixton was flying the 80 h.p. Tabloid. Bad visibility caused seven pilots to drop out, Barnwell and Pixton included; consequently the 100 h.p. Tabloid's racing capabilities were not demonstrated.

Harry Hawker returned to England on that day, and on June 7 gave a fine exhibition on the Schneider Tabloid at Brooklands. It was in this aircraft, at the end of June, that Hawker experienced an inverted spin, having stalled at 1,000ft while attempting an engine-off loop. Hawker managed to regain a measure of control as the Tabloid neared the ground, but it struck a tree and slid to the ground, a remarkably lucky Hawker escaping uninjured.

Some days before that occurrence, the Schneider Tabloid had been entered for the London - Manchester race with Hawker as pilot; the date of the event was June 20, 1914. This was a chance for the Tabloid to show its mettle against its only serious British rival, the Bristol Scout. Unfortunately, Hawker became ill while flying and had to abandon the race.

The last great long-distance race in which British pilots participated before war broke out was the London - Paris - London contest, held on July 11, 1914. The field did not, however, include a Tabloid.

By that time several Tabloids were in existence. It was well that this was so, for the fuse of the European powder keg had been lit two weeks earlier by the grim events in Sarajevo. In *Flight* for June 5, 1914, it was reported that "No. 60 Sopwith Scout" arrived at Brooklands on Tuesday, May 26, 1914. No. 2 had arrived on April 25, No. 3 on May 8, No. 4 on May 12 and No. 5 on May 20. These reports seem to indicate that the prototype, the Schneider Trophy machine, and six production Tabloids had been built, and the use of the term "scout" almost certainly indicates that the production machines were for the R.F.C.

Although it was not the first single-seat scout to be built (it was preceded by several months by the Royal Aircraft Factory B.S.1), the Tabloid was certainly the first production aircraft to go into service as a single-seat scout with the British flying Services. During the 1914-18 War, all single-seat fighters were popularly known as scouts, but the Tabloid was specifically intended for high-speed scouting (i.e., reconnaissance) flights.

The production aircraft were single-seaters. The power unit was the 80 h.p. Gnôme, but its installation resembled that of the Monosoupape in the Schneider Tabloid: the upper and lower longerons were drawn together to meet in a point, thereby giving the production Tabloid a longer nose than the prototype. The tail unit was revised to resemble that of the Schneider machine: a fixed fin of 1.875 sq ft area with a plain rudder (4.27 sq ft) and a new tailplane of shorter span were fitted. The undercarriage skids were longer than those of the prototype; their front struts were likewise longer and had a more pronounced rake. Some Tabloids had an additional strut in the undercarriage bracing, and the Sopwith divided axle was used to provide independent springing for the wheels. On the Tabloids which went to the R.F.C. the flying wires were duplicated, but at least one R.N.A.S. Tabloid retained single flying wires, augmented by a single drag wire on each side running from the frontal junction of the longerons to the upper end of the forward interplane strut.

One of the first production Tabloids was allocated to No. 7 Squadron during that unit's first brief period of existence from May to August 1914. The squadron was broken up to strengthen Nos. 2, 3, 4 and 5 Squadrons, which were destined for France, and the fate of its Tabloid is not known.

The ultimate production Tabloid had ailerons and a plain vee undercarriage. Drawings of this version are dated June 1914.

When the British Expeditionary Force went to France in August 1914 there can have been few more harassed individuals than the landing officer at Boulogne. On August 19 his exasperation was implicit in the telegram he sent to British General Headquarters: "An unnumbered unit without aeroplanes which calls itself an Aircraft Park has arrived. What are we to do with it?" His statement was not quite accurate, for the Aircraft Park did in fact have four aeroplanes among its equipment. (Sixteen others—nine B.E.2s and 2as, one B.E.2c, three B.E.8s and three Henri Farmans, which made up the Aircraft Park's strength—had either been allocated to squadrons or flown direct to Amiens.)

The four machines were Sopwith Tabloids, and all were in packing cases. It appears that no squadron of the R.F.C. had a Tabloid on its strength at the time war broke out; certainly none was with any of the four units which went to France on August 13 and 15.

In fact, the Tabloid saw very little service with R.F.C. squadrons. The earliest record of their operational use occurs in Major J. T. B. McCudden's book, *Five Years in the R.F.C.* He notes that, on August 26, 1914, ". . . we saw two very fast machines come in, and on inspection they proved to be Sopwith 'Tabloids' (small single-seater scouts with 80 h.p. Gnôme engines), flown by Lieutenants Norman Spratt and Gordon Bell." The Tabloids were almost certainly two of those belonging to the Aircraft Park, for their famous pilots were then on the strength of that unit.

McCudden went on to say: "They did not avail us much as fighting machines, in that they were not fitted in any way with firearms, but they could and did perform excellently from the scouting point of view." Although his aircraft was unarmed, Norman Spratt nevertheless forced down an enemy machine which had bombed the R.F.C. "aerodrome" (actually the local race-course) at Compiègne by outflying it. McCudden says that Spratt had "a handful of flechettes"* in his Tabloid, but it is doubtful whether he used any: he circled above the German machine and delivered feint attacks.

That combat, if it can be so called, occurred on August 28. Three days later, Spratt again took off to attack an enemy aircraft, this time being armed with a revolver from which he fired thirty rounds into the German aeroplane, but without success. He landed and prepared another weapon—a hand grenade tied to a

* Steel darts, about five inches long and ⅛in in diameter, intended primarily as anti-personnel weapons.

The Schneider Tabloid, flown by Howard Pixton, at Monaco.

A "Flight" photograph of the Schneider Tabloid after its return from Monaco, fitted with wheel undercarriage.

THE SOPWITH TABLOID, SCHNEIDER, AND BABY. . .

long piece of wire cable; with this he intended to fly above an enemy machine and try to entangle the cable and grenade in its propeller.

Apparently he had no chance of putting this desperate device to the test of combat. Late in the evening of the following day he took off in pursuit of a Zeppelin which was reported to be near at hand. Returning to Serris after dark, the Tabloid overturned on landing, but Spratt was unhurt.

The Tabloid's operational service with the R.F.C. was brief. The type was used by Nos. 3 and 4 Sqns.; probably only one example was with each unit. By the spring of 1915, no Tabloid remained in France: the few still with the R.F.C. were at training units.

At the outbreak of hostilities the R.N.A.S. had one Tabloid on its strength, and on August 5, 1914, Sqn. Cdr. A. M. Longmore (now Air Chief Marshal Sir Arthur Longmore, G.C.B., D.S.O.) and Maj. E. L. Gerrard went to Brooklands and Hendon, with instructions from the Admiralty to requisition aircraft and engines belonging to civilian organizations and individuals. Included in their mixed haul was a Sopwith single-seater which may well have been the prototype Tabloid, for photographs show its rudder bearing the white rectangle on which serial numbers were painted in those early days.

Other Tabloids went to the R.N.A.S. By mid-September 1914, Cdr. C. R. Samson noted that "two Sopwith Tabloids were daily expected to arrive from England" for his squadron, which was then at Antwerp. The Tabloids materialized as Nos. 167 and 168, and were at Antwerp by the end of September. Early in the following month it became clear that Antwerp could not be saved from the enemy. Samson was ordered to get his aeroplanes and armoured cars away from the city by October 7, leaving only certain aircraft which were to attack the airship hangars at Düsseldorf and Cologne.

The machines which remained were the two Tabloids; the officers detailed to fly them were Sqn. Cdr. Spenser Grey and F/L. R. L. G. Marix. Mist obliged the officers to defer their take-off; by early afternoon on October 8 the weather had not improved, but the enemy was on the point of entering the city and it was imperative to attempt the raid then or never. Spenser Grey took off in No. 167 at 1.20 p.m., but found misty conditions persisting over his target area of Cologne and failed to find the airship sheds. He therefore bombed the railway station and returned to Antwerp at 4.45 p.m. The enemy started to shell the aerodrome at 8.30 p.m. and damaged No. 167 irreparably. Spenser Grey therefore left for Ostend by car.

Marix took off at 1.30 p.m. and found the Düsseldorf airship sheds without difficulty. Diving down over his target, he released his two tiny bombs at 600ft. Both scored direct hits: the shed roof collapsed, and a 500ft flame marked the premature end of a new Zeppelin, the Z.IX, which had been commissioned only on July 29, 1914. The Tabloid was repeatedly hit by defensive gunfire, but Marix managed to get to within twenty miles of Antwerp before running out of fuel. Abandoning No. 168, he returned to Antwerp partly on a bicycle borrowed from a peasant, partly on a railway engine; he was in time to join Spenser Grey in his car.

Both officers amply deserved their awards of the D.S.O., and their raids constituted the only really spectacular wartime achievement of the Tabloid.

Commander Samson again had two Tabloids on the strength of his unit in February 1915, when based at Dunkerque. These Tabloids were armed with a Lewis gun carried above the centre section on a mounting devised by W/O. J. G. Brownridge and Lt. T. Warner of the squadron.

Four Tabloids were allocated to No. 1 Sqn., R.N.A.S., in December 1914, but they did not distinguish themselves in any operational way.

On February 1, 1915, the aircraft carrier *Ark Royal* sailed from Sheerness harbour on her first operational mission, bound for the Dardanelles. On board she had eight aircraft of four different types: the Short seaplane No. 136, two 200 h.p. Wight pusher seaplanes, three Sopwith 807 seaplanes, and two Sopwith Tabloids. *Ark Royal* reached the island of Tenedos on February 17; but her Tabloids found no employment, for on all Tenedos there was no ground that could immediately be used as an aerodrome, nor could any be prepared without arduous and protracted work. It seems doubtful whether those Tabloids ever flew from Tenedos, for on April 8 the carrier went to Mudros and exchanged them for two Sopwith Schneider seaplanes.

On March 24, 1915, Samson arrived at Tenedos with the advance party of his squadron, now styled No. 3 Aeroplane Squadron, R.N.A.S. The unit's aircraft could not be landed until the 26th and 27th, for a gale was blowing. Two Tabloids were among the 18 machines (of six widely differing types) which constituted No. 3 Sqn.'s equipment, but they, too, seem to have found no operational use. In the official history,[1] H. A. Jones observed:—

"The Tabloids, owing to limited vision, were useful chiefly for single-seater fighting, and there was to be little opportunity for them to do the only thing they could do."

Samson, when describing the aircraft of No. 3 Sqn.,[2] wrote of the Tabloids that they were

". . . not of very much use, as although they were fast and had a gun, they were not efficient as fighters in those days before inventors discovered how to fire through the propeller area. Also they had a habit of shaking out their engines."

The final sentence is of interest.

At least one machine, which has been described as a Tabloid, had a fixed machine-gun firing forward through the propeller disc. Doubtless experimental, this machine had a stripped Lewis gun on the starboard side of the fuselage, attached to the upper longeron on that side. No interrupter or synchronizing gear was fitted: the propeller was armoured with steel deflector plates similar to those originated in the summer of 1914 by Mons. R. Saulnier. The results obtained with this experimental Sopwith single-seater are not known. The aircraft itself had a plain vee undercarriage in which the vees were narrower than those of the converted Schneider Trophy winner, and large wing-tip skids were fitted. The engine of this aircraft appeared to be a 100 h.p. Gnôme Monosoupape.

Precisely how and when the Tabloid finally disappeared from the Service is obscure. No doubt a few ended their days at training units, and some were with coastal stations of the R.N.A.S. In mid-May 1914, Tabloid No. 1208 was at Great Yarmouth, but the unit's Workshop Report stated: "No. 1208 (Sopwith aeroplane) vibrating badly, requires cause looking into." Perhaps Cdr. Samson's Tabloids were not unique in their reprehensible habit of shaking out their engines.

But if the Tabloid's wartime service was brief and largely unspectacular, its seaplane descendants—overworked and patient—flew on until the Armistice, the only British single-seat seaplanes to be used operationally.

(To be continued)

[1] *The War in the Air*, Vol. II, page 24. [2] *Fights and Flights*, page 223.

SCIENCE MUSUEM PRESENTATION

RECENTLY presented by the Esso Petroleum Company to the Aeronautical Department of the Science Museum, South Kensington, was a series of illustrations of historic aero-engines. These were the originals of the drawings used by Esso in advertisements for the company which appeared in *Flight* and other publications during 1956, and which aroused much interest at that time among aviation enthusiasts in this country and abroad.

At a luncheon held in London recently, the pictures were presented by Mr. D. C. Ward-Campbell, aviation manager of the Esso Company, to Mr. W. T. O'Dea, keeper of the Science Museum's Aeronautics Department. Thanking the company for its gift, which had been made at the request of the museum, Mr. O'Dea referred to the future plans of the Aeronautics Department. A new aeronautics gallery at the museum, he said, was expected to come into use in 1961. This would add an area of some 250,000 sq ft. Shortage of space would remain a problem, however, for there were at present a number of old aircraft owned by the museum which were being kept in storage at Byfleet, Sydenham and Reading. Mr. Ward-Campbell said that the production of the pictures had been a joint effort involving the Science Museum, Samson Clark and Co., Ltd., and his own company.

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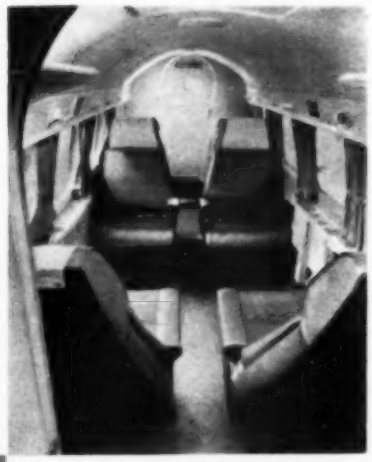

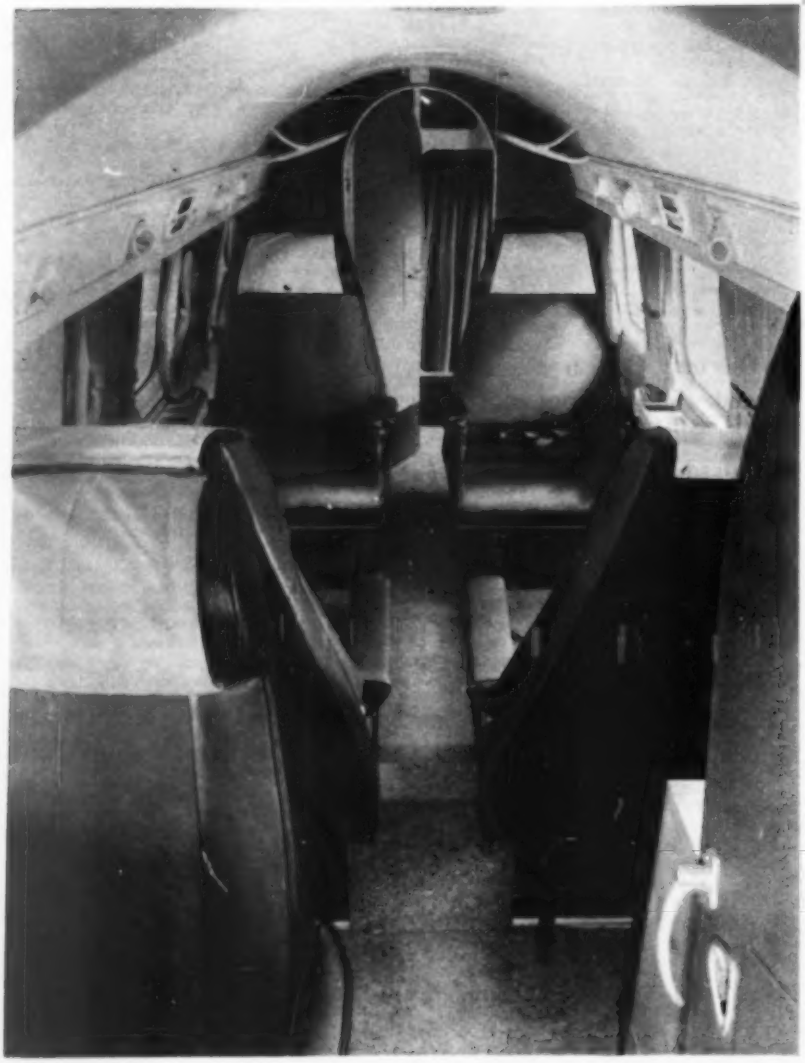

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AIRCRAFT ENGINES PROPELLERS

A Vertol HUP-2 helicopter, converted by the Edo Corporation into an amphibian, on test. A news item concerning this interesting development appears on this page.

AIRCRAFT INTELLIGENCE

U.S.A.

Edo-converted HUP-2. The Edo Corporation has completed flight tests of a Vertol HUP-2 helicopter converted into a hull-type amphibian. Modifications include a reinforced hull bottom, all-metal outrigger floats, and a re-ducted engine cooling system. Conversion was achieved without major alteration to the standard HUP-2 undercarriage. Uses are expected to include "improved plane guarding in carrier escort, anti-submarine warfare applications, improved safety in over-water ferrying of personnel and aircraft—in short, much improved safety in all aspects of over-water operations." The aircraft has been landed at forward speeds of 30 kt in 1½ft waves and taxied at 15 kt through 2½ft steamer swells. At the time of the tests wind velocity varied between 12 and 15 kt. In Flushing Bay, adjacent to the Edo plant, the machine was taxied upwind, downwind and crosswind, and also made 360 deg turns pivoting around one float. Despite the closeness of the rotor blades to the water a notable absence of ground resonance is reported, and it is stated that this proximity of the rotor blades to the water actually enabled the machine to lift heavier loads than it could from land.

Cessna YH-41 Seneca. The name Seneca has been conferred on the YH-41 helicopter, the first examples of which have now been delivered by Cessna Aircraft to the U.S.A.F., which will test them for the U.S. Army. This four-seater cruises at speeds up to 124 m.p.h. and is designed for reconnaissance, casualty evacuation, pilot training and other duties.

France

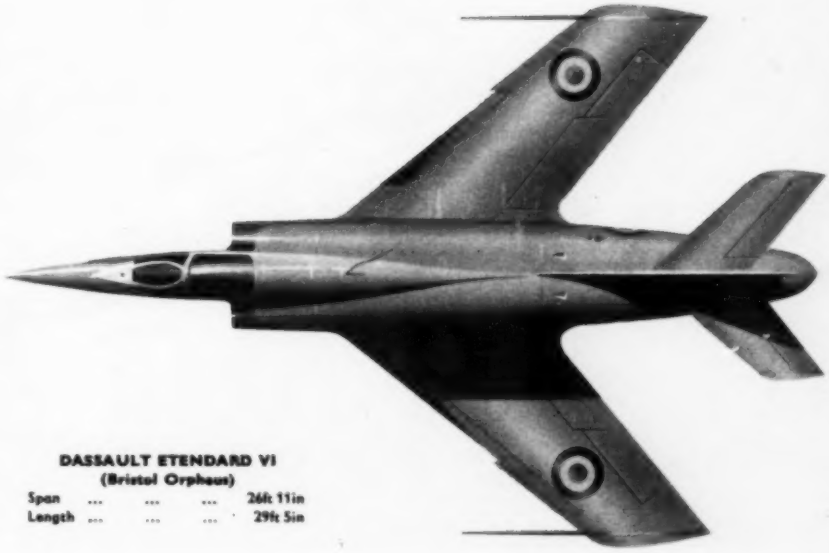
Morane Saulnier Paris. This four-seater jet executive aircraft completed its South American tour—begun on July 15 last—on October 21, having visited eight different countries, flown for 225 hours and carried more than 1,200 people.

Bréguet Licence for Do 27. The Ateliers d'Aviation Louis Bréguet is now the representative company in France for the Dornier Do 27 STOL aircraft, and the company also has an option to produce this machine in France.

SNCAN Gerfaut and Griffon. The delta-wing Gerfaut is now being studied in the intercepter rôle and has fired missiles (mounted under the fuselage) at supersonic speeds. The more advanced Griffon has been on trial at Istres with its ramjet in operation.

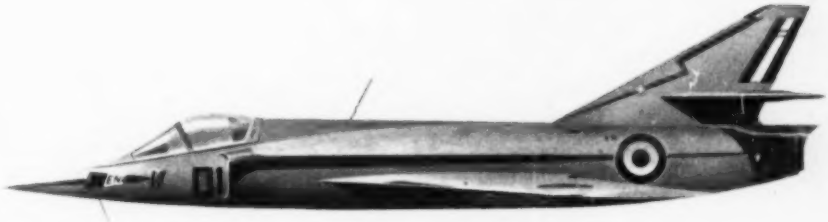
Japan

Japanese Air Power. A total of 1,055 aircraft was available to the three Japanese Services (Air Self-Defense Force, Ground Self-Defense Force and Maritime Self-Defense Force) as at October 1 last. The Air Self-Defense Force had 709, made up as follows: T-34, 140; T-28, 1; T-33, 168; C-46, 34; T-6, 147; Vampire Trainer, 1; F-86F, 217; KAL, 1. The Ground Self-Defense Force had 237, comprising L-5, 32; L-21, 56; H-13, 16; L-19, 100; LM, 27; H-19, 6; and the Maritime Self-Defense Force had 109, made up of T-34, 1; SNB, 6; S2F, 10; TBM, 20; PBY, 2; H-13, 7; S-51, 3; SNJ, 29; P2V, 8; PV-2, 15; JRF, 4; KAL, 1; H-19, 3.



DASSAULT ETENDARD VI
(Bristol Orpheus)

Span	...	...	...	26ft 11in
Length	...	...	...	29ft 5in



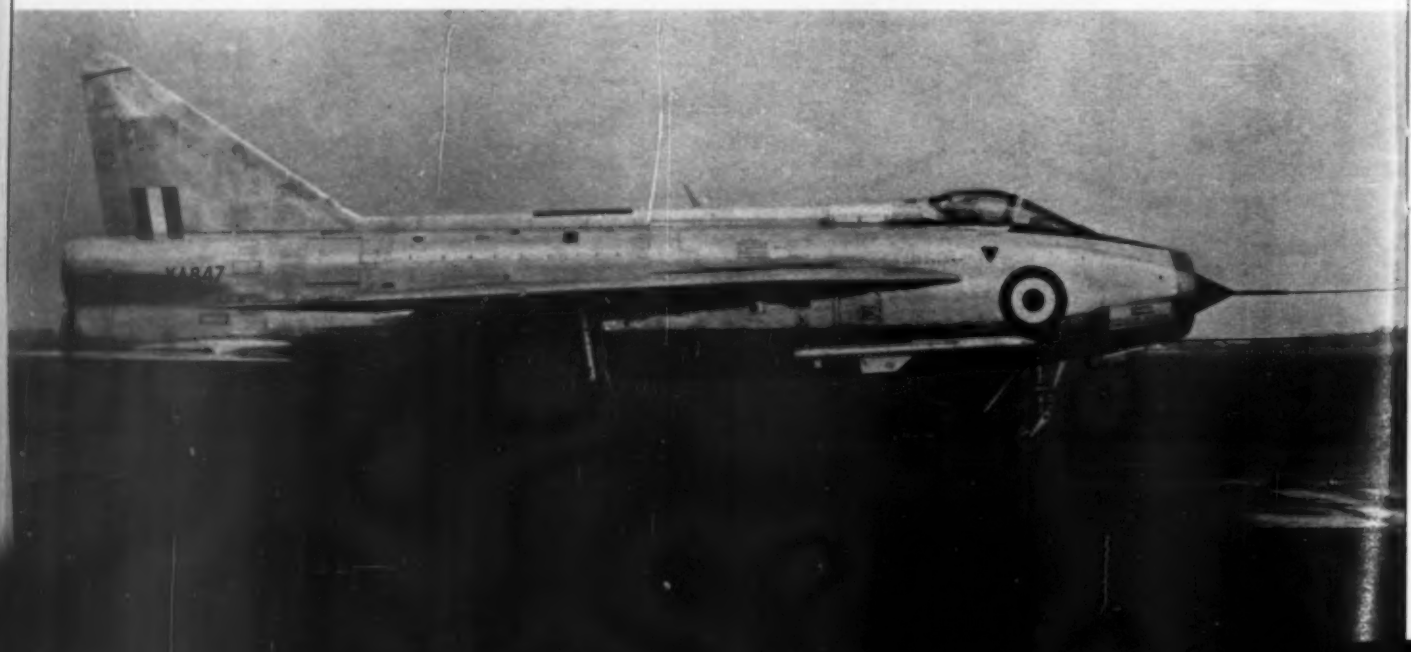
THE FRETFUL SKY

"Sometimes gentle, sometimes capricious, sometimes awful, never the same for two moments together; almost human in its passions, almost spiritual in its tenderness, almost Divine in its infinity." In thus portraying the sky, John Ruskin—like many an artist and thinker before him—proclaimed his wonder at its inexhaustible variety. And truly it is almost human in its passions, as witness these new photographs by Mr. J. Whittaker of English Electric, showing it in sullen, fretful mood. With their modern flying aids the pair of Canberras—two of a large batch of B.8s for the Indian Air Force—can afford to scorn that mood. These handsome machines have a silver finish, unlike their counterparts serving with the Royal Air Force in Germany, which wear the standard camouflage scheme.

WEAPON SYSTEM

NO weapon system can be complete without a weapon; and although English Electric P.1A prototypes have carried 30 mm Aden guns, it has long been known that the principal armament of the P.1B would be air-to-air guided missiles. These photographs are the first to show the type of missile—the D.H. Propellers Firestreak—mounted on a P.1B, although the configuration of the system was revealed in a model which was exhibited at the 1957 S.B.A.C. show (*Flight*, September 6, p. 393).

Although a single-seater (in its intercepter form, at any rate) the P.1B has been designed for all-weather operation, and it obviously carries far more aids, and much more comprehensive radar, than any previous R.A.F. machine of its class. It seems fairly evident that the conical centre-body inside the intake houses a search-radar scanner, with which the P.1 will hunt for its target after having been vectored by ground-control. The infra-red homing head, or seeker, of the Firestreak is probably switched on during the entire mission. As soon as the pilot receives a positive indication that either missile has "locked-on" to its target, that round can be fired, and left to home on to the hot parts of the enemy machine. Each Firestreak rides in a standard shoe, carried on the end of a horizontal pylon. Although unusual, this arrangement of stores has much to commend it.



CARRIER WORK-UP

A Landsman's Reactions to an Unfamiliar Environment

"The cartridge starters of the Hawks spurt grey smoke in split-second unison." These are the aircraft of 806 Sqn.

"Flight" photograph

IN this account an ordinarily non-flying member of our staff records his impressions of a three-day visit paid last week to the fleet carrier H.M.S. "Eagle." The original intention was that the article should describe an exercise by "Eagle" in company with "Ark Royal," "Bulwark" and certain units of the Royal Netherlands Navy; but at the last moment "Eagle" was detached from the force in order to carry out an independent work-up with her squadrons. No attempt is made here to describe in detail the operational set-up of carrier flying; readers in search of such information are referred to the feature articles published in our Naval Aviation special number of March 22 this year, wherein another staff member described a week in "Ark Royal."

FROM the rearmost seat of the Gannet, where one perforce sat rearward-facing, four others of No. 814 Sqn. could be seen waddling, ungraceful as ducks ashore, around the perimeter track of hospitable R.N. Air Station Culdrose. As always, their contraprops looked absurdly small, like tiny spinning windmills pinned on the noses of toyshop aeroplanes.

Up and out in a series of steepish turns through the low cloud and mist sweeping over Cornwall's Helford River and (look at your map if don't believe it) Goonhilly Downs. Up and out into glowing October sunshine, the other Gannets closing into formation with us. And now the ugly ducklings are transformed into aeroplanes: if lacking the grace of a Sea Hawk, they at least have the "right" look of any piece of machinery designed to do a particular job efficiently. One of them is displaying a Gannet characteristic—the occasional emission from the jet-pipe of a small round puff of black smoke (carbon, some people aver).

Ninety-odd nautical miles of foam-flecked English Channel crawl beneath, then we let down into a circuit; and suddenly there she is, all 46,000 tons and 803 feet of her, the fleet carrier H.M.S. *Eagle*, ironing out a three-mile long ribbon in the crinkled green. A succession of improbably small aeroplanes, just identifiable as Sea Hawks and Sea Venoms, are coming home to roost on her decks, and hovering off her port quarter as steadily as though supported on an invisible wire is the attendant Whirlwind helicopter on planeguard duty.

Two or three minutes in the circuit and it is the Gannets' turn. *Eagle's* wake, all one can see from this tail-end disadvantage-point, grows closer and wider beneath, looking like boiling ginger-beer. Then *crump*, immediately followed by the firm comforting embrace of an arrester-wire. A second's pause to clear the hook, and a smart taxying forward, to park behind the close-packed Hawks and Venoms, with the Gannet's wings simultaneously folding overhead like the arms of a Siamese temple-dancer. The Double Mamba's whine trails into silence, and one clambers down among the huddled aircraft. It is not until you begin to walk away from them that you become aware that the green-painted ground beneath your feet has a just perceptible rising and falling motion. It must therefore, you assume, be the deck of a ship. One has indeed arrived, albeit backwards, in a strange new world.

* * *

Exactly how strange becomes apparent the moment one leaves the flight deck, and a friendly welcome does not altogether dispel the feeling of bewilderment. Designed like her sister ship *Ark Royal* to be virtually unsinkable, *Eagle* is a honeycomb of steel. Ladders (not ladders in the landsman's context, but narrow-treaded staircases at the near vertical) emerge on to decks *via* high coamings, over which one unsuspectingly prepares to clamber, only to receive a stunning crack from the deck-head above. Every alley-way is an obstacle-race of high sills and watertight doors. On the white-painted bulkheads are fascinating notices: R.M. PART OF SHIP; DANGER AREA, NO SMOKING; KEY-BOARD FLAT; OFFICERS' HEADS. [The two last refer not to pianos and commissioned craniums, but to (a) the area in which hundreds of keys to this and that are kept under armed guard in glass-fronted cabinets and (b) the Navy's time-honoured term for lavatory accommodation.]

And up and down and across and through this steel warren is a ceaseless coming and going. Everybody is in a hurry, and nobody, with the possible exception of non-flying officers and an occasional petty officer, looks like the normal conception of a sailor. A young man in a dark blue open-necked shirt and blue jeans; another in the coloured helmet and windproof overalls of the flight-deck personnel; a pilot in his immersion suit; a smartly uniformed Royal Marine officer; an engineer officer in white overalls; a flour-dusted figure from the ship's bakery. For bell-bottomed trousers you will look in vain.

But all this is, so to speak, the wings of the stage. From a gallery seat—the little platform above the flying-control bridge, where a ship's photographer stands to record every single landing—you may watch the daily (and often nightly) non-stop drama of action, colour and sound.

The backcloth, which may change startlingly at the whim of the weather gods, is at this moment a clear cold blue above silver-green waves from which a near-gale is tearing the tops in smoking white spume. The stage is the flight-deck, and ranged along its port side aft are four Sea Hawks wearing the ace of diamonds insignia of No. 806 Sqn., two others bearing the wasp *motif* of No. 803, and beyond them four Sea Venoms of No. 894, distinguished by a fish-tailed Pegasus. Right aft, near the round-down, are two Skyraiders (No. 849) and two Gannets (No. 814). Also embarked in *Eagle* are No. 813 with their Wyverns, but they are not taking part in this particular launch.

"The chopper"—one of the two Whirlwinds forming "A" Flight of No. 701 Sqn.—takes off and swings over to its station on the port beam about a hundred yards distant and slightly above flight-deck level. The deck is now nearing the peak of its activity, a peak reached every 65 minutes as each new recovery and launching cycle comes round. In coloured helmets or jerkins signifying their duties, the men of the deck parties act with quick precise movements, some at the double, some at a brisk walk; others may be lying at full length in readiness to pull away chocks; only a few, such as the red-helmeted or asbestos-suited fire fighters and the medical personnel in their red-crossed jerkins, are likely to be standing still. Speed and economy of action are paramount; not a single step is taken in any unnnecessary direction, and never does one see a step retraced in doubt (one false move, perhaps into line with a jet-pipe, can spell injury—or worse). The only thing that ever seems to slow up movement is the wind, against which men sometimes have to struggle as though wading through mud.

Seated on a revolving stool in "Flyco," his control position jutting out from the island, the Lieutenant Commander (Flying) passes orders to the flight deck by red, amber and green traffic lights or by telephone, and occasionally he will slide back his window and make a flag or hand signal. His orders are passed on by the Flight Deck Officers and by the Pilots' Mates standing by each aircraft. Now the start-up signal is given, and the cartridge starters of the Hawks spurt grey smoke in split-second unison. The first two are waved forward to the catapults by the yellow-helmeted aircraft directors. Straight and fast each is taxied into position, and before it has stopped rolling a man leaps on to the wing root to make a final check of the fuel fillers on top of the fuselage, then slides nimbly clear of the jet-pipe.

Unlike her sister-ship *Ark Royal*, *Eagle* has yet to be equipped with steam catapults, hers are of the type operated by a com-

"One of the quieter places in the ship is the glass-enclosed . . . compass platform." Here are seen the Captain of "Eagle," Captain M. Le Fanu, D.S.C., R.N., with (left) Cdr. P. L. Langly-Smith, R.N., second-in-command, and Cdr. P. C. Heath, R.N., the Commander (Air).

CARRIER WORK-UP . . .

bination of hydraulic and air pressure. The aircraft is halted against the mechanically retractable chocks, and simultaneously moved bodily sideways—usually only a few inches, for the pilots taxi accurately—by the power-driven positioning rollers. Men lying prone attach the launching bridle between catapult shuttle and aircraft catapult lugs, and also the tail hold-back—a metal link which fractures when the critical load is reached.

Between the catapults are the two howdahs—retractable transparent boxes like square astrodomes—housing the men who pass the firing signal down to the catapult room below. Just forward of them stands a Flight Deck Officer, holding a toy-sized green flag (anything bigger could scarcely be raised against the gale). The bridle men scramble clear and the F.D.O. lifts his flag and circles it above his head, the pilot "winding up" his engine revs in obedience.

Swamping the noise of the Hawk waiting on the starboard catapult, the sound rises in a tearing, shattering roar that seems to penetrate every fibre of one's body (why has no jet aircraft on land ever seemed so noisy?). The pilot raises his hand, indicating full r.p.m., the F.D.O. whips down his flag. There is a second's pause, then the Hawk shoots forward, so instantaneously that the eye cannot detect progressive acceleration. It loses no height after it clears the deck, but the pilot holds down until adequate climbing speed builds up.

The F.D.O. now turns to dispatch the second Hawk—it is away within 20 seconds—and the next two are brought forward. So the process is repeated, until all the Venoms have followed the Hawks and all is clear for the free take-off of the propeller-driven aircraft. The dark blue Skyraiders trundle forward along the angled deck, their blade-tips tracing a spiral of condensation-vapour, leap out from the left of the catapults, and at once go into a confident climbing turn to port. Finally, the two Gannets, cockpit canopies open, snarl away.

No sooner is the last clear of the ship than the arrester wires are raised and recovery of the previous detail begins—Hawks, Venoms and Wyverns that have been airborne on their various exercises for the past hour. As each aircraft turns on to the penultimate leg of its approach it seems to be heading straight towards the port side of the ship; but somehow one has forgotten that this airfield is moving forward at some 30 knots, and not until the pilot has made his final turn to port does one realize that he is now well aft and heading down towards the wires, lining up on the deck centre-line and adjusting his height by the mirror sight on the port side. If the white light reflected on the mirror is above the level of the horizontal bars of green lights which flank it he is too high; if below it, too low. One straight line of white and green tells him that all is well, though he must still watch his speed. The mirror setting is adjustable to meet the landing characteristics of the particular aircraft type, and normally it is set so that the arrester hook should engage the second wire.

Plenty of power is kept on—particularly important in the case of jets—so that an overshoot can be made if the wires are missed. The carrier pilot makes no flare-out from his descent path, and watching from the island one has the impression of the aircraft being literally thrown down on the deck; the sight gives one a new respect for undercarriage designers and manufacturers and the material they use.

The wire is pulled forward in a long vee again the elasticity of its hydraulic shock-absorbers. The moment the aircraft stops it is allowed to roll back a foot or two while its hook is retracted and the wire drops clear and returns to its straight-across position. (Simultaneously two men have darted out from opposite sides of the deck in readiness to pull it clear should it fail to disengage.) Then the pilot taxies quickly forward to his parking position, folding his wings as he goes.

Should a pilot miss the wires—whereby he becomes a "bolter"

(Below) "When I found my viewfinder full of Gannet," says photographer Macdonald, "I thought I'd better duck"; but he pressed the button first. (Top, opposite) Four of No. 803's Hawks pass over "Eagle"; this picture clearly shows the semi-angled deck, and the forward lift-well. (Bottom, opposite) A belly-tanked Wyvern of No. 813 is ranged on the positioning rollers of the port catapult (note also the two rows of retractable chock-rollers); another Wyvern is taxying up to the starboard catapult. This picture was taken from the planeguard helicopter.

"FLIGHT" photographs

"Flight" photographs

(Left) Catapult launching—in this case of an 894 Sqn. Sea Venom—usually means loss of the bridle. (Right) Refuelling a Venom at night.

CARRIER WORK-UP . . .

and is saluted by the discharge of two red Very lights—he slams on full power and stands off until he can be fitted into the circuit again.

As soon as the whole detail—perhaps a dozen or more aircraft—has been recovered, plus the planeguard helicopter, the comparatively empty deck becomes alive once more, though now the tempo is just a little easier, the deck personnel chiefly concerned being those responsible for refuelling and re-arming. The two hangar lifts sink and rise to an accompaniment of warning bells, and tractors and servicing vehicles scurry about their errands. Meanwhile the ship has reduced speed and turned through 180 degrees, so that she is now steaming downwind, and the chilly flight-deck gale drops to a mild breeze.

* * *

A visit to the catapult room whilst launching is in progress is a slightly intimidating experience. Space is at a premium, and one finds oneself squeezing along a narrow, greasy catwalk between a row of vast compressed-air bottles on one side and, on the other, a gloomy gallery. In it, above a sizeable swimming-pool of oil, are the enormous ram and the pulley-sheaves which, *via* wire ropes as thick as a man's wrist, multiply the speed of the ram's thrust. Warning lights flash on the control panel, bells ring, the operator pulls his lever (it has triple interlock safeguards that make a premature firing impossible) and the whole thing goes into monumental action for a couple of seconds; the general effect in this claustrophobic space is of standing in a railway tunnel through which a giant is hurling a double-decker tram. Yet, as in so many other departments of the ship, the Chief E.R.A. in charge clearly regards this formidable alliance of steel, compressed air and oil with all the pride and affection of a fond father for his golden-headed child.

* * *

One of the quieter places in the ship, even during a launch, is the glass-enclosed bridge—or, as it is known, the compass platform, and the flying-control position which, leading off it, overlooks the flight deck. The compass platform, one may say, is purely nautical both in its equipment and in the various tasks of the officers and other ranks who inhabit it. Here, scarcely ever leaving his post except to take a quick meal or a cat-nap, is to be found the Captain, an incredibly cheerful individual ("I'm just a fish-head, though I thought I'd better learn to fly an Auster"), whose chief aim seems to be to keep his Flyco neighbours happy by so manœuvring his ship, if humanly possible, as to fit in exactly with all their varied requirements. "Can I come back to my course, please?" we heard him call across to them. So politely. And once again a preconceived notion was shattered. . . .

If life in Flyco itself is a little less peaceful than on the compass platform, there is still never even a suspicion of flap. Lt-Cdr.(F) appears to have the enviable facility of being able to talk imperturbably into several microphones and telephones at the same time. He works surrounded by people equally on top of their jobs, exchanging with them the minimum of brief essential comments. To the presence of various others who congregate in his vantage-point for no apparent reason he seems politely oblivious. Only when, at the end of a recovery, he rises from his stool and gives the order "Down foxtrot" (the "F" flag denoting flying in progress), does one detect the termination of a period of slight tension.

* * *

No. 813 Wyverns on a rocket strike. . . . Half a mile astern of the ship bobs a smoke-float, insignificant as a garden bonfire. Out of the sun, from 6,000ft, the leader plummets down in a 60-deg dive. The streaks of the 60 lb R.P.s are just discernible, then suddenly the bonfire is obscured by great fountains of spray and dirty brown smoke. Seconds after, the hiss of the rockets and the thuds of their S.A.P. warheads float across the water. Another Wyvern attacks from a different quarter, then two simultaneously almost from opposite directions, crossing as they pull out of their dives.

* * *

The onlooker, they say, sees most of the game. And, sitting up front with the pilot of the planeguard Whirlwind as it keeps station on the carrier, you see the point of the old *cliché*. In the cabin behind, with its open door, are the winchmen, ready for a perilous dangle at the end of the wire should a pilot have to be fished out of the heaving green turmoil below. The helicopter pilot, you notice, never once takes his eyes from the carrier's deck as the aircraft shoot out from the catapults.

Perhaps, from sheer familiarity, he is unconscious of the sheer grim beauty of this great war vessel—functionally ugly perhaps in comparison with an Atlantic liner of comparable size—as her sharply flared bows contemptuously fling aside the waves in tumbling cascades of white and green.

With a mild shock of surprise, one notices that her stern is not altogether unlike that of some early sailing ship, with a wide flat transom running up towards a box-like counter from which hang two small boats. . . .

As helicopters cannot in general operate at night, the duties of after-dark planeguard are assumed by an escort—in this case the new frigate H.M.S. *Puma*, appearing from nowhere in particular at sundown.

One's first reaction on standing on the island to watch night deck landings is that of seeing the absolutely impossible actually happening. Setting aside noise and the warm, not unpleasant smell of Avcat fuel (both of which, after a day or two, become less noticeable through familiarity), much of the picture can be drawn in terms of light and darkness. Mostly darkness, for every compartment of the ship above flight-deck level is illuminated only by dim red light, every opening in the island is heavily curtained, and the flight deck itself delineated only by a few faint rows of amber lights; amber, too, replaces, the white lights in the mirror aid.

Red and green wing-tip navigation lights approach from the port beam, and a third light appears between them as the arrester hook is lowered. "Too high," says one of the goofers (the critical audience of aircrews and others who congregate both by day and by night at various vantage points on the island). "No, he'll make it," says another.

The lights waver slightly as the pilot lines-up and makes his final corrections; then they swoop towards the near-invisible deck, and now the familiar *crump* is accompanied by a shower of sparks as the hook strikes the deck, and by the glow of the downward identification light beneath the Sea Venom's fuselage. Released, the wire returns to its taut position in a glitter of tiny friction-sparks over its whole length.

Guided by the directors, who are now using illuminated wands glowing like dully-red-hot pokers, the Venom switches on red wing-fold lights and taxies forward, its instrument-panel lighting repeating the reddish-orange colour pattern.

The next aircraft, perhaps, is a "bolter"; the navigation lights swoop downwards a little too late, and the dim dark shape flashes past with a blast of sound as the pilot opens up the Ghost to full thrust. As the aircraft climbs away you see the trembling orange-mauve glow inside its tailpipe.

Now a Skyraider comes in and taxies along the deck with big purple flames flicking from the exhaust stubs of its Cyclone, accompanied by a nostalgic *chacka-chacka-chacka* almost reminiscent of Mono Avros; and the next arrival may be a Gannet, presenting an illuminated version of its praying-mantis wingfold, with a small red light at every hinge.

* * *

Night launches are less spectacular, for little can be seen except the green-glowing wand which has replaced the F.D.O.'s flag, and the dull glare in the tailpipes as the aircraft climb away.

But the next item provides a new spectacle, for it consists entirely of "touch-and-go," a familiarization technique whereby each pilot makes a succession of circuits, on which, with arrester-hook retracted, he brushes the deck with his wheels and climbs away again. One has seen a club Tiger Moth doing just that on a grass airfield on a sunny afternoon. But one has *never* seen a powerful night-and-all-weather fighter doing it; *and* in the dark; *and* on an obstruction-fringed slab of steel floating in the English Channel. Once again, you just don't believe it.

* * *

And so ashore by Gannet, this time in the centre cockpit, so that one can see what a free-take-off looks like from the business end. Ashore with a load of interweaving impressions of this unfamiliar world. What can one sort out? First and foremost, perhaps, the sense of an unself-conscious team spirit, whether it be in the quiet depths of the Operations Room and the Aircraft Direction Room, where men watch in radar scopes, and record on vast Perspex panels, the comings and goings of *Eagle's* brood (and, if necessary, of less friendly birds and fish); in the far less quiet Aircraft Control Room, where the location of every aeroplane in and on the ship is tallied from moment to moment; in the echoeing hangars and maintenance workshops; in the breathless heat and unrelenting roar of the engine rooms.

Even in peace-time the aircrews and deck-men in particular are doing—let's face it—a dangerous job. Long and arduous training and a complex mass of regulations have been imposed to reduce that danger to an irreducible minimum. Cheerful acceptance of and obedience to those regulations is coupled at all levels with an unmistakeable enthusiasm for the job. Thinking back to that game of touch-and-go in the roaring darkness, one sees how in H.M.S. *Eagle*, as in the other aircraft carriers of the Royal Navy, it is just these things that make the impossible possible.

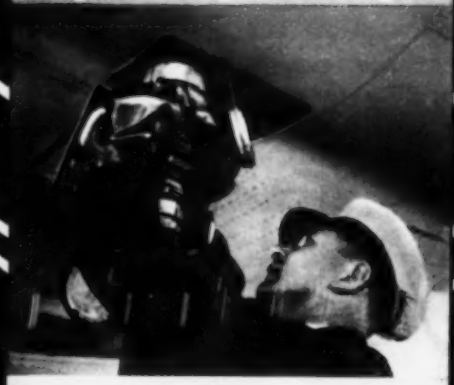
R. E. C.

"EAGLE'S" SQUADRONS

No. 803—Sea Hawks (Lt.-Cdr. J. O. Roberts). No. 806—Sea Hawks (Lt-Cdr. W. D. D. Macdonald). No. 813—Wyverns (Lt-Cdr. R. W. Halliday, D.S.C.). No. 814—Gannets (Lt-Cdr. R. Fulton). No. 894—Sea Venoms (Lt-Cdr. P. G. Young). No. 849 "A" Flight—Skyraiders (Lt-Cdr. B. J. Williams). No. 701 "A" Flight—Whirlwind helicopters (Lt. (S.D.) A. W. Webb).

FLIGHT, 8 November 1957

SHELL



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'I should like to say a word about the future of the Royal Air Force . . . The introduction of new weapons will be a gradual process, extending over a good number of years, and even then there will still remain a very wide variety of roles for which manned aircraft will continue to be needed. I therefore hope that young men who have the ambition to be pilots, as well as those who are interested in new technical advances, will continue as before to look to the R.A.F. for a fine and useful career.'

MINISTER OF DEFENCE, APRIL 16TH 1957

Flying in the

THE NEED FOR PILOTS, navigators and air electronics officers is as urgent as ever . . . and the career prospects no less promising. Weapons change, tactics change, but the role of the Royal Air Force today remains the same.

MORE OPPORTUNITIES—NOT LESS

To a young man ambitious to fly, and with the ability to lead others, the R.A.F. offers a fine and useful career. Men of high quality are required to fly the V-bombers, fighters and high-speed reconnaissance and transport aircraft. Even for those functions where unmanned missiles will in time give the answer, manned aircraft must continue in service for a number of years yet. Moreover, manned aircraft will *always* be needed for those functions to which the human brain in the air is indispensable. And, whatever new instruments of air power are evolved, the R.A.F. will always need men of initiative who have been trained to master the problems of the air in the air. For such men this is a time of opportunity. Not only can they fulfil their ambition to fly for as long as they serve. They will have the chance of a full and satisfying career. Aircrew do much more than fly. They are often seconded for other important work in Britain and abroad. Variety is more than ever the essence of a career in the R.A.F. Whatever a man becomes—pilot, navigator, air electronics officer—there is no limit to what he may achieve. Quality counts. There is, and always will be, room for good men.

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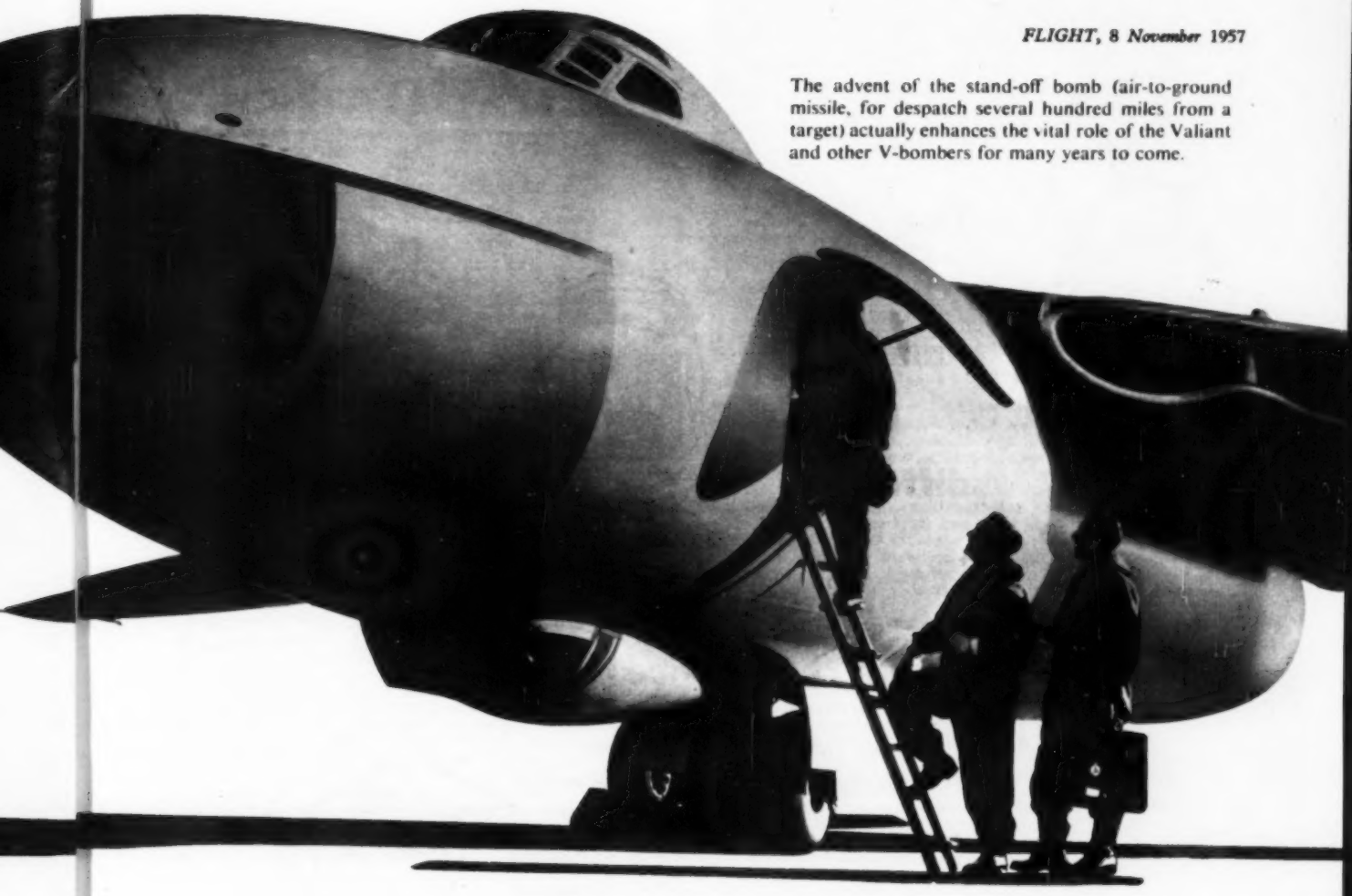
You can join the R.A.F. through the Direct Commission Scheme, confident of a permanent career right up to pension age. Or you can choose a twelve-year engagement with the option of leaving after eight. If you leave after 12 years you take back to civilian life a tax-free gratuity of £4,000! Alternatively, there is a five-year Short Service Commission Scheme, and for University Graduates, a special four-year Short Service Commission. Whichever you choose, the pay is good. At the new rates, a

The advent of the stand-off bomb (air-to-ground missile, for despatch several hundred miles from a target) actually enhances the vital role of the Valiant and other V-bombers for many years to come.



e missile age

Flight Lieutenant of 25, can draw, with full allowances, about £1,500 a year.

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RESPONSIBILITY. To fly with the R.A.F. is to work with the most dependable men in the world, confident and well qualified for each of the many calls on their skill and initiative.

ADVENTURE. R.A.F. personnel were aboard the *M.V. Theron* as she returned with the advance party from the Commonwealth Trans-Antarctic Expedition, on the 23rd March this year.

The Royal Air Force *Flying . . . and a career*

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...but the Service is the same

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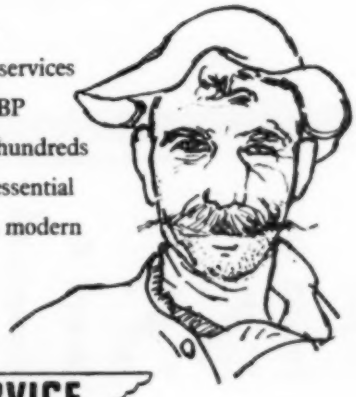

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No. 5 SQUADRON

A History of the "Fighting Fifth"

By JOHN YOXALL

PART 3

"Flight" photographs

THE squadron was now (March 1944) flat out against the Japanese. Each day the diary records all available aircraft at readiness and operations going on throughout the 24 hours. Night Rhubarbs, day and night interceptions, low-level attacks on Japanese positions, interdiction and "Pintails" (the last-named dropped at the request of the Army). Flying hours totalled 855 for the month, including 715 operational. At the end of March two moves were made, first to Wangjing and then to Lanka.

Despite the intensive fighting at the time, casualties were low; but a good man was lost on April 25 when F/O. Boyes, who was attacking a Japanese staff car, rolled on to his back and crashed. Air fights were very few but operational flying hours alone for April amounted to nearly 1,000.

In June 1944 came another move, this time to Dergaon, where operations continued at the same intensity until the 23rd, when the squadron moved back to Vizagapatam for a rest period. The journey, which was very trying for the ground party, took 11 days.

There were other moves—to Yelakanka, Cholavaram, Trichinopoly and Kajamalai—and a change of commanding officer, S/L. J. M. Cranstone, a New Zealander, succeeding S/L. Hogan. The Hurricanes, too, had been superseded by Thunderbolts. The next operational flight was not until the day after Christmas. It was an uneventful escort to DC-3s dropping supplies in the Mayu valley. The squadron was now at Nazir.

The diary records that "the morale of the squadron personnel continues to be seriously affected by the very evident misapprehension on the part of units and H.Q.'s, including A.C.S.E.A., that No. 5 Squadron with its low identity numeral is an Indian Air Force squadron." The people who made this mistake are in good company, for the Air Ministry's Air Historical Branch has made the same error.

Although there had been so many changes, operational duties remained the same though not at quite the same intensity. Operational flying for January 1945 amounted to 703 hours. A blow the squadron suffered was the replacement of the Mk 2 Thunderbolts by some worn-out Mk 1s, which gave a good deal of trouble with engine failures. Since the Arakan Yomas mountains had to be crossed to get to the targets these failures were very disturbing.

By March 1945 monthly operational hours were back again to near the 1,000 mark—this with an average aircraft availability of only 13.7. The news of successes on all war fronts put the squadron on its toes. A majority of the sorties were "cab ranks" for the army, who found the targets and called the aircraft in to attack.

When V.E. day came, No. 5 was at Kyaukpyu under 24 hours' notice to move back. Victory in Europe was duly celebrated by an extra issue of beer, and a move back to Bobbili for a rest. V.J. day found them still at rest, with all their Dominion aircrew gone and, by the end of August, expecting shortly to be on their way to an unknown destination.

It was not, however, until December, after months of boredom, that any move was made, and then when half of the echelon was on its way to Sumatra news came that the squadron was to be disbanded. In January came more welcome news. The disbandment was off and a conversion to Tempest 2s authorized. The big trouble then was to get back all the personal kit, which had gone to Sumatra and Malaya, for it was now decided that the squadron should stay in India, at Bhopal.

Duly on March 5, 1946, the first three Tempests arrived, one of which was piloted by S/L. Murphy, the Hawker test pilot who stayed with the squadron until conversion was complete. The new aircraft were received with terrific enthusiasm and all pilots had flown them by the 20th.

But in common with every other Service unit at the time the run-down through demobilization and "end of war" outlook began to be felt. By July 1946 established strength was down to one quarter. The unit was now at Poona. It was a difficult period, especially for S/L. Rothwell, who tried his utmost to keep the old No. 5 Squadron spirit going.

Detachments went to various stations, including the familiar Miranshah; but so short of men was the unit that all training flying had to be stopped. Eventually in July 1947 all the aircraft were handed over to Nos. 1 and 9 Squadrons of the Indian Air Force and the squadron set sail for England and was disbanded. The official disbandment date was August 1, 1947.

On February 11, 1949, No. 595 Squadron, commanded by S/L. D. H. L. Farmer, D.F.C., A.F.C., and stationed at Pembrey, Wales, was re-numbered No. 5 Squadron and, as the official record states, applications were sent to the appropriate authorities for No. 5 Squadron's history, silver, trophies, etc. On charge were Harvards, Oxfords, Martinets, Spitfires and a Moth. The main duty of the squadron comprised flying for the School of Anti-Aircraft Artillery at Manorbier, Pembroke. It was not a very exciting period and, like its predecessor, the new squadron was suffering from the run-down which every unit experienced after the war.

During October 1949 a move was made to Chivenor in Devonshire and co-operation with the R.A.F. Regiment at Watchet was added to the Manorbier duties. Christmas was spent in the traditional fashion—but it is recorded that a few airmen, by

Above, 44 years of No. 5 Sqn.—members representing its early, middle and late periods who attended the final parade. Left to right are Col. L. A. Strange (1913), A.V-M. H. J. Kirkpatrick (1934) and S/L. T. P. Fargher (1957). Below, a massed start by the squadron's Venoms at Wunstorf in Germany, No. 5's home at the time of its latest disbandment—on October 12.

REPUBLIC THUNDERBOLT 2
1944

HAWKER TEMPEST 2
1946/7

DE HAVILLAND VAMPIRE
1952

DE HAVILLAND VENOM 1, 4
1955

No. 5 SQUADRON . . .

acquiring extra helpings of turkey, damped the spirits of the others!

In January 1950 Beaufighters replaced the Martinets. From the manpower aspect No. 5 was at a very low ebb, with eight officers and 67 airmen.

Flying for Manorbier and Watchet, in addition to flying training, persisted month in and month out. The only relief was practising for the squadron's share in the R.A.F. Display at Farnborough—attacking Amiens prison—and for the Battle of Britain programme. By the end of the year some Vampires were taken over.

From July 1951 onwards the squadron was on another run-down, before disbandment on September 25. The squadron diary remarked: "All will look forward to seeing the No. 5 Squadron Maple Leaf fluttering amongst the top squadrons again one day." The foregoing remark was written by F/L. M. W. Huggins, D.F.C., who was very proud indeed to have commanded for nine months such an eminent unit.

No. 5 is next heard of at Wunstorf on March 1, 1952, as a fighter squadron, under the command of S/L. V. G. Daw. Vampire 5s formed the major portion of squadron equipment but there was also one Meteor 7 on charge. Flying training comprised weapons, navigation, air support, Wing and squadron exercises, interception and night flying. Life for the squadron became a succession of periods of training and operations. Breaks came with detachments to Duxford, Odiham and Sylt—the latter, of course, for air firing.

December saw the start of re-equipment with Venom F.B.1s, and conversion flying to the new type started. Flying was hampered by much bad weather and by teething troubles. For the first few months of 1953, monthly flying totalled only about 220 hours; but by April it had increased by nearly 100 per cent. A major misfortune the squadron suffered was the loss of S/L. Daw while on a training flight from West Raynham.

The squadron was extremely pushed at this time, trying to maintain a training programme and finding sufficient aircraft for fly-past rehearsals for the R.A.F. Review. One way and another, however, No. 5 coped with both of these commitments as well as detachments to various places.

Early in 1954, several Venom sorties were flown to exercise No. 652 A.O.P. Squadron in evasive tactics with their Austers. The diary records: "It must be admitted that so far the Austers have had the better of the deal." In fact it was decided that the Austers were fairly safe.

S/L. P. Ayerst, D.F.C., became C.O. on January 19, *vice* S/L. C. S. West, and he was in command when, on April 24, the squadron received a standard.

It was presented by Air Chief Marshal Sir Leslie N. Hollinghurst, G.B.E., K.C.B., D.F.C., who in a short speech recalled the days when he served with No. 5 in India. He hoped, he said, that the squadron would have a future as bright as its illustrious past.

In July 1955 the squadron was equipped with Venom F.B.4s and an interesting aspect of the integration of NATO forces occurred when it flew for a short period from the French Air Force base at Bremgarten in the Rhine valley. Certain difficulties were experienced but it is recorded that the attachment proved a highly successful mobility exercise and the assistance and co-operation given by the French was of the highest order.

Early last year command of No. 5 passed to S/L. T. P. Fargher, D.F.C., the last C.O. before disbandment. Under his command, the enthusiasm for which the Fighting Fifth has always been renowned has been maintained right up to disbandment. Last July the squadron set new records for both low-level and high-level shooting, in September put in more jet flying than ever before and within three weeks of disbandment took part in a major exercise. Security forbids the publication of details of any recent operational work.

To mark this last disbandment a wing parade was held at Wunstorf. The reviewing officer was A. V-M. H. J. Kirkpatrick, S.A.S.O. at H.Q., 2nd T.A.F., who was accompanied by A. V-M. S. R. Ubee, A.O.C. No. 2 Group. After No. 5 Squadron had marched past with their standard, A. V-M. Kirkpatrick recalled in an address the highlights of the unit's history and of his own service with it in India. At a luncheon which followed, Col. Louis Strange recounted experiences of the squadron's very earliest days. Those reminiscences were followed with rapt attention, his audience obviously feeling very honoured at having such a distinguished ex-member with them on this occasion, and only regretting that the other two early members—G/C. Carmichael and Lt-Col. Wilson (who contributed to this history)—were unable to be present.

A final ceremony on the day of disbandment was the handing over of the Standard to A. V-M. Kirkpatrick for him to take back to 2nd T.A.F. H.Q., where it will be laid up in the church of St. Boniface.

The maple leaf with its superimposed Roman V will be removed from the Venoms and the personnel scattered to other units and commands. But No. 5 Squadron, R.F.C. and R.A.F., will live on in spirit and, who knows, may yet be re-formed once more before all manned squadrons give place to automation.

Below, No. 5 Squadron in April 1957. The officers are (in cockpit) F/O. D. C. Mullen; (standing, left to right) F/L. B. N. Wonstall, S/L. T. P. Fargher, F/O. P. C. Morris, F/L. G. Roberts, F/O.s P. C. King, M. I. Russell, C. L. Trethewey, G. H. D. Inward, G. de W. W. Harris, R. D. Elliman; (kneeling) F/O.s D. R. Anderson, J. B. Cummins and A. E. Howard. "Flight" photograph

The View Ahead

Seeking the Ideal Aircraft Windscreen

By L. F. E. COOMBS

MANY years have passed since (with few exceptions) the open cockpit disappeared, yet it would seem that less attention has been devoted to the pilot's field of view than to most other aspects of development. Among the windscreens designed in this period some shapes have proved to be more efficient aerodynamically than others. The step-down type was angled to be a compromise between the requirements of adequate vision and minimum drag; and some "streamlined" shapes have failed to give the pilot an undistorted and adequate field-of-view.

In large aircraft during the past 20 years the most popular alternative to the conventional motor-car windscreen has been the streamlined "greenhouse" as used on the Heinkel 111, the B-29, B-50 and Caravelle/Comet. Although such an arrangement provides the maximum fenestration the net gain to the pilot is not as high as might be expected, because the individual windows are comparatively small and are set at an acute angle to the pilot's line of sight during an approach; more than one B-29 approach-training accident was attributed to the distortion of the outside view by the flight-deck windows.

With the canopy on a single-seater it is comparatively easy to balance the requirements of high and low speeds, because the fineness ratio can be larger than that of a "side-by-side" flight deck. In the latter type, however, it is not so easy to adopt a large fineness-ratio arrangement without forcing the pilots to use an acutely sloped forward-view window or the designer to adopt a cross section which cannot be pressurized. Conversely, pressurization requirements—thick structural members, double paned windows and thick glass to withstand the missile effect of a 50-knot bird hitting a 500-knot aeroplane—have contributed to some of the bad design-features of flight decks.

When the first enclosed cockpits and flight decks were introduced it was possible to seat the pilots reasonably close to the glass so that they could obtain the maximum field of view between the structural members. But with the introduction of more and more instruments and controls pilots have been forced to accept badly lit short-range vision inside the cockpit and a long-range anti-collision view outside. The former requirement has caused

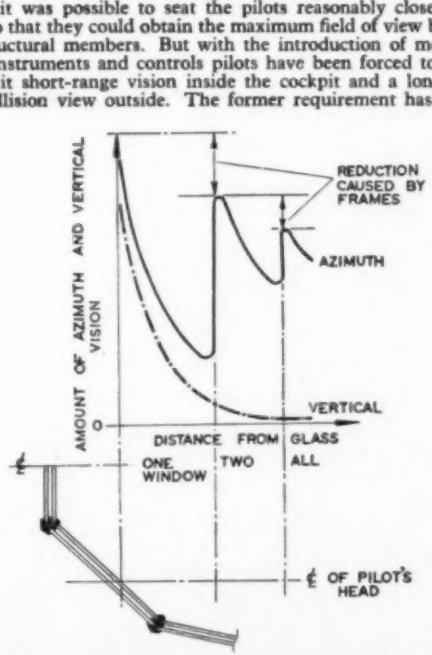


Fig. 1. Field of vision depends upon the distance from the windscreen panels. Double-paned windows and thick structural members, as shown here, are both responsible for substantial reduction in vision.

the pilot's seat to be pushed farther and farther away from the windows.

The seating position relative to each window has to be a balance between the effective area of instruments that can be viewed close-to and the field of view obtainable when sitting farther aft. Unfortunately, the optimum seating position can also be the position at which the "no vision" arcs of the windshield structure are greatest. In other words, the best seating position for access to the controls, easy scanning of the instruments, and head and shoulder room, is also the position from which the pilot is required to select individually framed views ahead and on each bow (Fig. 1).

This does not take into account the fact that the field of view in the vertical plane does not increase away from the optimum point as it does for the view in azimuth. If your nose is on the glass you will subtend the maximum arc of vision, which will then decrease as you move aft.

Consideration of all the major conflicting flight-deck interests appears to indicate that the maximum view can be obtained from a large aircraft when the pilot's face is closer to the windscreen than is customary. For the reasons just mentioned this is usually impracticable, although in a single-seat aircraft with a bubble canopy it is possible to obtain a good view ahead and to the sides. In practice the pilot of the large aeroplane overcomes some of the shortcomings of the view ahead by moving his head; so he can, in theory, select an infinite number of viewpoints, each one giving the field required for a particular purpose.

The most important view of all is that used for the final phase of an instrument approach, when the pilot has to project his mental and visual senses from inside the flight deck to a point perhaps 1,000 yd ahead (and often under a cloud ceiling of 250ft to 300ft). It is here that the designer can be of great assistance if he ensures that the apparent shape of the window frame in front of the pilot provides a rectangular frame of reference. The aircraft's trajectory and attitude can then be instantly related to the approach lights or to the ground pattern.

Mr. E. S. Calvert of the R.A.E., who has devoted considerable research into the guidance characteristics of approach lighting, has remarked on the poor quality of the visual guidance available in the vertical plane when executing the final, "visual" phase of an instrument approach. In reasonable visibility the pilot can determine the point where his trajectory will intersect the runway; he does so by observing which of the points on the ground remains stationary relative to the natural horizon. In "instrument" visibility it is not possible to obtain a visual aiming-point comparable with that of the instrument landing system. In other words, if the I.L.S. needles and datum could be projected on to the window, then the runway, approach lights or ground pattern and aiming-point would gradually fill in the picture so that it would not be necessary to abandon the I.L.S. indications and spend most of the 10 to 15 sec between then and crossing the threshold in establishing a safe trajectory without adequate guidance in the vertical plane. The problem of finding an approach lighting system or ground pattern which will tell the pilot whether he is undershooting or overshooting is outside the scope of this article.

One proposal which could assist the pilot would be an elaborated optical reflector gunsight with gyro stabilization. A projected "natural" horizon would appear at the correct position in front of the pilot, with a circle or dot to show the aiming point of the aircraft trajectory relative to the horizon. Such a device would require time and money to develop and would take up flight-deck space, so an alternative or interim solution will have to be found. (It is interesting to note that the Royal Aircraft Establishment has produced an experimental optical sighting device and an improved angle-of-approach indicator.) It would appear that, given an acceptable approach-lighting system, a well-defined ground plane —chequered markings or a grid of lights—and an improved angle of approach indicator, the external indications will be reasonable. The picture is completed by a rectangular frame of reference so that the aircraft attitude can be determined from the position of the natural horizon, or its substitute, within the framework of the pilot's window.

A rectangular frame of reference cannot be obtained without adopting window frames which conflict with the most economical arrangement of structural members. As an example, one of the simplest structures for a pressurized flight-deck canopy is one in which the major frames are great circles of a sphere. However, if attempts are then made to provide a rectangular frame of reference for the principal window the frames will have to be "dog-legged." In practice a horizontal reference is provided by making the top of the panel shroud level instead of allowing it to fall off to each side (see Fig. 2, p. 748).

The comparison of cockpit fields of view published in *Flight* for January 11, 1957, provided an interesting example of the "irregular" frame to the pilot's view ahead and, incidentally, also emphasized the absurdity of expecting one member of a two-pilot crew to keep an adequate look-out for other aircraft which may be in the vicinity.

Irrespective of the type and number of windows provided there is an essential requirement for adequate peripheral vision of the ground during the final phases of an approach. If the pilot's peripheral vision is restricted then it will be no better than that of a person who suffers from "tunnel" vision—which, if severe

THE VIEW AHEAD . . .

enough, would prevent him driving a car, let alone an aircraft. Adequate peripheral vision assists the pilot to estimate his distance, trajectory and acceleration in the major co-ordinates relative to the touch-down or aiming point.

Another windscreen difficulty is that, despite improvements that have been made in forward vision, the problem of maintaining a window's "visibility" during heavy rain and ice-accretion has

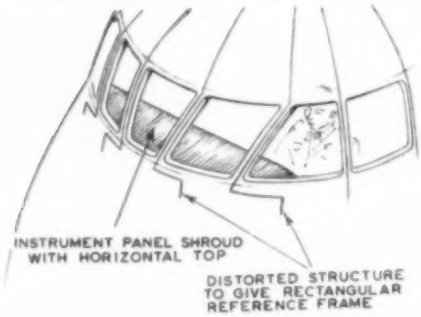


Fig. 2 The simplest type of pressurized canopy must be dog-legged round the windscreen panels to provide the "rectangular frame of reference" discussed in this article.

not been completely solved. The rubber-to-glass oscillating wiper has sufficed for moderate airspeeds, but increasing approach speeds now make it obsolete. B.C.A.R.s call for a clear view during speed up to 1.6 times stalling speed—about 150 kt in modern types.

One alternative to the wiper is an airstream deflector which will operate over a wide speed-range. The aerofoil designers have been able to produce an amazing variety of slats, slots and flaps with which to control and constrain the air flowing around a wing —but there have been very few attempts to apply that knowledge to the most essential problem of keeping a windscreen clean. Another alternative is a blast of hot air bled from the engine compressors and directed against the outside of the glass.

To comply with B.C.A.R.s, an aircraft design must include one really accessible window which the pilot can open without difficulty, even in severe icing conditions. The view from this window has to be from 20 deg port to 10 deg starboard and from the horizontal to 5 deg downwards. This clear-view requirement is a difficult one to meet, for at least two reasons: a window which can be opened needs a thicker-than-normal framework to house the pressurization seals and the mechanism and hinges for opening it; and although the necessary field of view is easily provided in a "flat-plate" canopy, in a streamlined type the projected area is very much greater than the effective area. On high-speed aircraft the clear-view window produces so much noise when it is opened that it is of little use.

The following, in the author's opinion, are the principal reasons why a really good field of view is so important:—

(a) To provide the pilot with the maximum amount of information, in the shortest time and with the minimum of eye-strain, during the final phase of the approach and during the worst weather conditions likely to be encountered.
(b) To assist him in avoiding collision with other aircraft.
(c) To help him in navigating by reference to ground features.
(d) To assist him in taxying at a reasonable speed over a complicated network of tracks and across aprons cluttered with other aircraft and ground-handling equipment.

The first three functions will not become of less importance until electronic aids, such as collision-warning radar, are made 100 per cent perfect and coupled approach aids operate down to an altitude of one foot.

With increasing circuit speeds coupled to higher traffic densities adequate provision will always have to be made for a good view. If a satisfactory result cannot be achieved, then the pilot must be able to depend on alternative ways of conning his aircraft. Either electronic devices must be introduced or a revolving nose will have to be designed which can be "indexed" to give the field of vision required for each phase of flight.

THE INDUSTRY

AN up-to-date list of Bakelite moulding materials complying with B.S.I. and Government specifications has been published by Bakelite, Ltd., 12-18 Grosvenor Gardens, London, S.W.1.

* * *

The western area offices of Evershed and Vignoles, Ltd., have now been moved from Shipley Road, Westbury-on-Trym, to the Stock Exchange Buildings, St. Nicholas Street, Bristol, 1. Mr. H. H. Harper remains the company's western area manager.

* * *

The Plessey Co., Ltd., has announced the formation of a subsidiary, Rosite, Ltd., which will produce at its Swindon factory a wide range of cold-moulded plastics for use in the electrical industry, under an agreement recently made with Rostone Corporation, Lafayette, Indiana, U.S.A. Joint directors will be A. G. Clark (chairman); A. E. Underwood; F. Beacroft; and P. W. Jones (U.S.A.).

* * *

Mr. G. M. Keightley has been appointed manager, and Mr. R. E. Bayliss assistant manager, of the British sales division of the Consolidated Pneumatic Tool Co., Ltd. Mr. Keightley, taking over the position formerly held by Mr. C. L. Fisher (who has relinquished it "to devote more time to broader issues of the company's affairs"), moves to London from managership of the Manchester branch; Mr. Bayliss has been manager of the Leeds office since 1946.

* * *

An English Electric Deuce digital computer installed in the analytical department at Belfast of Short Brothers and Harland, Ltd.—first users of this type of computer in Ireland—was formally handed-over to them recently. Short's analytical department (formerly known as the mathematical services department) has been reorganized for the increasing mathematical calculation and computation involved in the design of modern aircraft and control systems. Under this reorganization, an existing battery of Short analogue computers has now been augmented by Deuce.

* * *

Designed and developed by the Weapon Division of the Fairey Aviation Company, Ltd., Heston, Middlesex, a new photo-electric safety ohmmeter is claimed to provide greater safety, accuracy and versatility than any other single instrument in this field. The power source for the resistance bridge is a high-sensitivity infra-red selenium photo-cell, the characteristics of which are modified during manufacture to limit the short-circuit current of the cell at light saturation, and yet maintain a high sensitivity at low illumination intensities. The instrument is designed as a safe test meter for monitoring wire-bridge types of electrical fuzes and continuity of explosive circuits.

* * *

Colour Sprays, Ltd., have moved from Hampstead to new office and factory premises at Albion Works, North Road, London, N.7 (tel. NORth 6091/4).

* * *

Mr. Raymond Woolf, who recently resigned from the London Plywood and Timber Co., Ltd., has joined W. M. Looman and Co., Ltd., 362-4 Old Street, London, E.C.1, plywood veneer and timber importers.

* * *

Mr. H. A. Herzogenrath has been appointed sales representative in Holland for Wolf Electric Tools, Ltd. Formerly sales export manager for the home tools department of the Dutch firm Edelstaal and prior to that sales promotion manager for K.L.M.'s Latin American division, Mr. Herzogenrath will work closely with the Wolf agents, Joh. Westhof Im-En Export Mij., N.V., Dr. Kuyperstraat 23, The Hague.

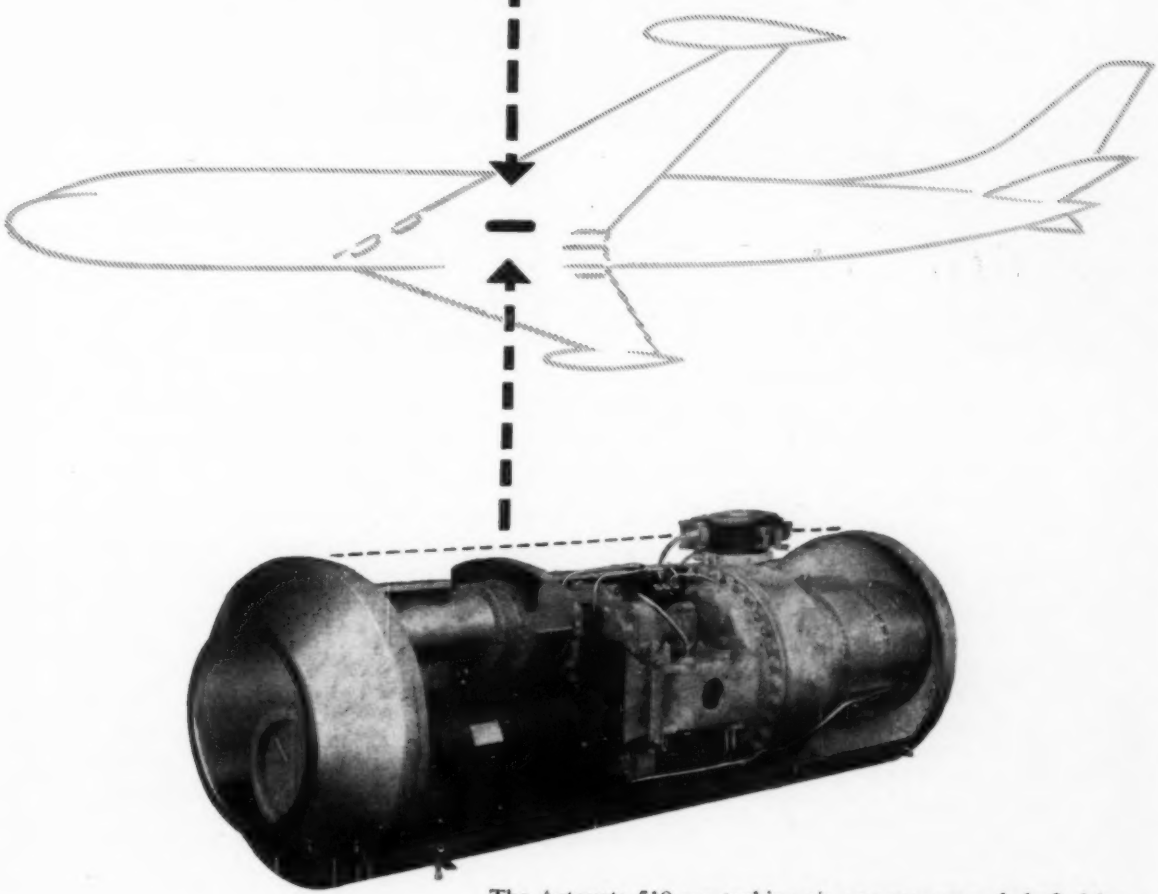
* * *

Under an expansion of trading interests by the Wakefield group of companies, headed by C. C. Wakefield and Co., Ltd., marketing of the group's chemical products is to be carried out through one of its members, Edwin Cooper and Co., Ltd., 43 Grosvenor Street, London, W.1. The Board of this company has been re-constituted as follows: Messrs. L. M. Broadway (chairman); W. Helmore (deputy chairman); G. H. Thornley (managing director); W. F. List; G. E. T. Eyston; J. A. V. Watson; L. G. Packham; L. Colkett (secretary); J. C. Cragg; and C. R. Woodfield.

* * *

Recently installed at the Willesden factory of Rotax, Ltd., was a hydraulically operated test rig for aircraft and missile actuators. Constructed by Steel Gauges, Ltd., of Birmingham, the unit incorporates hydraulic equipment supplied by Keelavite Rotary Pumps and Motors, Ltd., Coventry. The control system of the rig is in two sections; one is the electro-hydraulic control of the rig itself, and the other an electrical control system identical to that of the aircraft or missile in which the actuators may be used. Test data are obtained by strain gauges, the readings of which are considerably amplified and then read from standard electrical recording instruments.

AIRBORNE AUXILIARY POWER UNIT



The Artouste 510 gas-turbine air compressor and shaft-drive unit weighs 400 lb. and, completely enclosed in a cylindrical container, is designed for installation in modern multi-engined aircraft to provide auxiliary power for AC/DC electric supply, low- and high-pressure pneumatic, including starting, systems and the hydraulic and vacuum systems.

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When the couplings are disconnected there is no spillage of the contents and no entrapping of air. Their use on aircraft is well-known and self-evident.

For use on ground equipment these couplings are ideal for re-fuelling various systems. They save a considerable amount of time and they form a most efficient means of dealing with the many fluids required by the modern aircraft.

Screw operated or quick acting types available.

Flexible Pipes

Lockheed-Avery flexible hose is made in several qualities; these range from hoses for oil and petrol connections to those for high-pressure hydraulic systems.

Medium-high-pressure flexible hose is also supplied in the fire-resistant form for aircraft power plants. This hose is suitable for piston-engine fuel and oil lines and also, in the appropriate sizes, for propeller feathering systems.

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CORRESPONDENCE

The Editor of "Flight" is not necessarily in agreement with the views expressed by correspondents in these columns; the names and addresses of the writers, not for publication in detail, must in all cases accompany letters.

Signpost in Space

MAY I say how refreshing it was to read the leading article "Signpost in Space" in your October 18 issue. It is the most real, in every sense of the word, assessment of the present situation that I have seen, and one I only wish would prevail throughout our rather stupid world. I am confident that most thoughtful people realize that this present era is the time for some fresh thinking.

Very gradually we are admitting that much of our previous thinking has been based on fallacies—fostered for many hundreds of years by certain people, or groups of people, who for various reasons saw fit to suppress truth, and substitute something more to their convenience.

Today, with the ever-increasing number of sightings of U.F.O.'s, people are asking the natural question: why are they coming into our atmosphere—and where do they come from? In making reply, we who are convinced of their reality find that there is little in our previous thinking or common knowledge that can explain them. And yet their existence cannot be ruled out as merely the imaginings of neurotic minds.

The satellite has brought "space"—and all the unanswerable questions connected therewith—into people's minds and, like yourself, I look forward to reading your chronicling of the efforts of statesmen worthy of the name towards leading the race back into the realms of true thinking—or "towards new worlds," as you so accurately describe the goal.

I trust the mention of U.F.O.'s is not offensive to you; but when I have discussed this subject with scientists, aerodynamicists and highly placed officers in the R.A.F., I have been pleasantly surprised to learn that the existence of these craft is not lightly dismissed, and I am wondering if they are here to assist us rather backward earth types to that new thinking to which you refer.

Rake, Hants. W. HOWARD JARVIS.

Veteran Aircraft

FOR some years I have been following the correspondence on veteran aircraft, and am struck by the apathy of those who profess interest, when it comes to definite action.

I would like to suggest that "the British aeronautical community" once again launch an appeal, as in the case of the Alcock and Brown Memorial.

Such an appeal could if necessary be preceded by a request for pledges to measure its support.

Luton, Beds. A. NEIL GOBBY.

LIFE is full of surprises! For years I thought the earliest examples of cabin aircraft were the British 1911 Piggott and 1912 Avro monoplanes. Recently I glanced through an American book called *All American Aircraft* and read that in 1911 a Cessna light plane with all enclosed cockpits flew for the first time from Enid, Oklahoma. Are there any similar examples prior to this date?

Birmingham, 14. MAURICE AUSTIN.

P.R.O.s in the Pillory

I HAVE been led to understand from reading about—and to a small extent being in contact with—the British aircraft industry, that most firms have a department under the heading "public relations" or "publicity" whose task is the distribution of information relating to its products to all who are, profess to, or are likely to be, interested in it.

For a number of years I have been interested in aviation, having progressed from the highly educational cigarette-card—*via* the dizzy heights of registration collecting—to my present pastime of digging up data on odd types and variants in order to preserve same for posterity.

During the course of events it often happens that a query cannot be solved by the process of reasoning, deduction or fellow contacts, so one goes full of hope to the manufacturer. If the query relates to an American or foreign type one is reasonably sure the postman is going to turn up with something good; but if the aircraft originates in Great Britain one awaits the outcome with morbid curiosity.

In at least 75 per cent of cases letters to British manufacturers result in no reply whatever. Those who do manage to get round to it mainly forward material surplus from Farnborough, or else information (the validity of which is questionable) obviously written by someone not too well up on the subject.

There are, of course, exceptions; but it is significant that these "bright spots" come from the smaller outfits who to a large extent earn their living by selling something, and not from the giants who seem to exist more or less wholly on government injections of a financial nature.

I would like to suggest to the public relations departments of the British industry that they act a little more realistically to outside requests for information. I do not necessarily mean that each letter should be rewarded with a monumental pile of expensive brochures, but merely that intelligent interest by a member of the public should be treated and acknowledged in the same manner as would (doubtless) a letter which arrived headed "Trans World Airlines."

Bristol. P. H. DOBBS.

The "Fighting Fifth"

THE history of the No. 5 Squadron by John Yoxall in *Flight* is very interesting and extremely well written; but I do object to him using the title the "Fighting Fifth." This was applied to the Northumberland Fusiliers long before an Air Force was ever thought of and we are very proud of it. Please tell Mr. Yoxall not to do it, Sir—taking someone else's honours!

Derby. ERNEST SMITHERS
(Late 5th Batt. Northumberland Fusiliers).

[J. Y. writes: It is to be sincerely hoped that that noble body of men, the Northumberland Fusiliers, truly are the *Fighting* Fifth; but in the sweet consciousness of their prowess they must remember that they are not the only Fifth which can fight. One has nothing but admiration for Mr. Smithers in turning the publication of a history of a Royal Air Force squadron into a laudatory notice for his old battalion. He, at least, fights hard.]

Early Aircraft Catalogues

I HAVE just seen a catalogue entitled *Humber Aeroplanes* issued by Humber, Ltd., of Coventry, apparently in 1910. It declares:—

"Humber, Ltd., have for a long time past devoted special attention to the production of aeroplanes, and, having secured the co-operation of some of the first experts and having utilized the long and wide experience they possess in the production of internal combustion engines, they have pleasure in submitting to their international clientele the accompanying particulars of their Aeroplanes and Engines.

"Both the Humber Monoplane and Biplane embody the results of the experience of the most accomplished Continental experts, which have been improved upon by the company's expert designers. They are, therefore, in a position to challenge comparison with any other aeroplanes for design, strength, lightness and excellency of workmanship."

The following prices are quoted: Humber monoplane, with three-cylinder 30 h.p. engine, £450; the same with four-cylinder 50 h.p. engine, £775; 30 h.p. three-cylinder "aerial motor," £125; 50 h.p. four-cylinder, with copper water jackets, £425; Humber biplane, £1,100.

Does any reader know of an older catalogue issued by a British aircraft manufacturer?

London, W.1. HISTORIAN.

FORTHCOMING EVENTS

Nov. 12. R.Ae.S.: Section Lecture: "Some Problems of Stability and Control," by H. H. B. M. Thomas, A.F.R.Ae.S.
Nov. 13. Royal United Service Institution: "The Aircraft Designer's Dilemma," by Dr. G. V. Lachmann, F.R.Ae.S.
Nov. 13. Kronfeld Club: Film Show.
Nov. 15. Institute of Navigation: Discussion on Doppler Navigation.
Nov. 19. R.Ae.S.: Section Lecture: "The Supersonic Wind Tunnel," by Dr. W. F. Hilton, F.R.Ae.S.
Nov. 20. Kronfeld Club: Talk by Peter Scott.
Nov. 21. R.Ae.S.: Guided Flight Section: Inaugural Lecture: "Guided Weapons and Aircraft: Some Differences in Design and Development," by J. E. Serby, C.B.E., B.A., F.R.Ae.S.
Nov. 26. R.Ae.S.: Section Lecture: "Some Aspects of Refrigeration in Supersonic Aircraft," by E. J. Gabbay, A.F.R.Ae.S.
Nov. 27. R.Ae.S.: Graduates and Students Section: "Flight-Testing Procedures at Supersonic Speeds," by W/C. R. P. Beamont, D.S.O., O.B.E., D.F.C.
Nov. 27. British Institution of Radio Engineers: A.G.M.
Nov. 27. Kronfeld Club: Talk by Wally Wallington.
Nov. 29. R.Ae.S.: Graduates and Students Section: Annual Dance.

R.Ae.S. Branch Lectures (to Nov. 28):—

Nov. 11, *Halton*, Film Show. Nov. 12, *Cambridge*, Lecture by Air Marshal Sir Victor Goddard. Nov. 13, *Brough*, Fourth Cayley Memorial Lecture: "An Historical Survey of Naval Aviation," by Rear Admiral L. G. Evans; *Chester*, "Ultrasonic Testing of High Strength Aluminium Alloys," by J. Crowther; *London Airport*, Brains Trust. Nov. 15, *Birmingham*, Ultrasonic Testing of Light Alloys," by J. Crowther; *Brough*, Annual Dinner and Dance; *Luton*, Dinner.

Nov. 18, *Halton*, Film Show. Nov. 19, *Luton*, Debate. Nov. 20, *Christchurch*, "Operation and Maintenance of High Altitude Aircraft," by Personnel of the U.S.A.F.; *Southampton*, Fifth Mitchell Memorial Lecture: "The Developments of Propulsion Systems for High Speed Flight," by Dr. S. G. Hooker. Nov. 20, *Weybridge*, "Medical Aspects of High Performance Flying," by G/C. H. P. Ruffel Smith. Nov. 27, *Hatfield*, "Experiences of an Airline Pilot," by Capt. O. P. Jones. Nov. 28, *Bristol*, Junior Members' Paper Competition; *Halton*, Film Show.

Among next year's Piper models, mentioned on this page, are the 160 h.p. Tri-Pacer (left) and the 150 h.p. Super Cub (above). Since its introduction in 1951 over 6,000 Tri-Pacers have been built. An alternative version of the Super Cub is powered by a 90 h.p. Continental engine. Basic prices are: Tri-Pacer, $8,595 (160 h.p.), $8,395 (150 h.p.); Super Cub, $7,150 (150 h.p.), $5,695 (90 h.p.).

CLUB AND GLIDING NEWS

USEFUL advice on how to avoid flying prosecutions is given in a recent *Private Aircraft Owners' Newsletter* circulated by the Royal Aero Club. This follows "some stiff fines imposed of late for breaches of flying regulations" which have resulted in "alarm and despondency among pilots, and quite a few letters to the Royal Aero Club." In certain cases, the newsletter states, the club will provide free legal aid.

Also disclosed in the newsletter is the fact that the M.T.C.A. have decided that light-aircraft flying and gliding times must be included in the specified limitation of flying hours per month for professional aircrew. "This extremely unhelpful piece of legislation," the club comments, "is one more example of restrictive legislation which discriminates against light aviation." Pilots affected by this ruling are invited to send their views on it to the Royal Aero Club.

ELSTREE Flying Club intend to adopt the Chipmunk as a standard training aircraft, eventually to replace the Hawk Trainer. This follows the successful completion of the first year's operation of Chipmunk G-AOSY, which amounted to 640 flying hours. A second Chipmunk is expected to enter service with the club within the next few weeks, when it will be possible to accept further *ab initio* pupils for training on the type. C.F.I. David Ogilvy comments: "Although the hourly Chipmunk rate is £5 10s we find that a student can train to P.P.L. standard in considerably fewer hours than on other types and the total cost of the course is about the same either way. The A.B.A.C. approved 30-hour course begins to become a practical proposition on the Chipmunk, but we have always found it virtually impossible for anyone to reach the required standard in those hours on either Auster or Magister."

Aircraft utilization at Elstree has improved this year. Up to October 15 a total of 3,240 hours had been flown; this was the same figure as for the comparable period in 1956, but was achieved with an aircraft fleet reduced (on average) by two machines.

WINNERS of recent competitions at Plymouth Aero Club, Roborough, are: *Butland Navigation Trophy*, 1 R. B. Holman, 2 T. Szparowski, 3 J. Layland; *Barber Cup* (*Landing competition*), 1 W. Boylett, 2 R. B. Holman, 3 T. Szparowski. The club's Hallowe'en Party took place on October 31; according to the latest newsletter from Roborough, this function's origins, "like Stonehenge and the Air Navigation Order," are shrouded in mystery.

COMMITTEE members of the Armstrong Siddeley Flying Club for the coming year, elected at the recent a.g.m., are Bev Adams, chairman and treasurer; Frank Hudson, secretary; Bill Harley, assistant secretary; Charles Reeves and Ruth Sully, assistant treasurers; Reg Cleaver, engineer; Ron Harman and Jim Hilton, assistant engineers; Stan Clarke, social secretary; and Charles Jaynes, public relations.

A COURSE of airmanship lectures has been organized by the Aviron Flying Club, Panshanger. The lectures are being held in London on Thursday evenings.

Sixty-two years old, Mr. Frank Waller is a member of the East Anglian Flying Club, Ipswich. Stated in the submitted caption to be "all set for a trip in the club's Tiger Moth," Mr. Waller would doubtless strap himself in and take a look at those mag. switches first.

FIRST winner of the Jean Bird Memorial Cup competition of the Experimental Flying Group is Russell Montague, following a series of week-end competitions recently. The cup is to be presented at the Group's annual general meeting on November 23. As reported in *Flight* of September 20, the recent Popular Flying Association rally at Sywell was won by G-ALIO, one of the Group's Hawk Trainers, flown by the C.F.I., Rex Nicholls.

NORTH LONDON AERO CLUB at Panshanger claim to have the oldest flying helmet still in continual use in this country. At present worn by the C.F.I., S/L. Derek de Sarigny, and previously by his father, Col. R. de Sarigny, O.B.E., the helmet has been airborne more than 8,000 hours over a period of 42 years. It was worn by Col. Sarigny (then a major) in 1916 when he commanded aircraft from the 39th R.F.C. Squadron, North Weald, in a successful attack on three Zeppelins.

FAIR OAKS Aero Club activity has recently amounted to a record 823 hours' flying during September and 525 in October. Grand total from the club's commencement of flying at Easter, 1946, to the end of October this year was 29,637 hours flown and 394 licences gained. Fair Oaks "doubt if any club in the country can beat these figures, even adding in the date, as we suspect some club to the west of Fair Oaks does."

HALIFAX GLIDING CLUB have taken delivery of their T.31B Tandem Tutor, which incorporates the wings and tail unit of the club's Tutor. Conversion of the Tutor into a Cadet is planned by the club, whose membership is now 35.

AMONG the members of the Waikerie Gliding Club, South Australia, who have recently qualified for gliding certificates, are Ron Brock, aged 11, and John Rowe, aged 12. Other members include two girls, aged 13 and 14, from Waikerie High School.

RECENTLY "unveiled" in Williamsport, Pennsylvania, were the 1958 series of Piper aircraft, comprising improved versions of the Apache, Tri-Pacer and Super Cub, and the new Comanche. Both Apache and Tri-Pacer feature an increase in power with the use of Lycoming O-320-B engines of 160 h.p. Always anticipated with pleasure by this office are the annual Piper disclosures of the new models' colour schemes. This year Bahama Blue, Hershey Brown, Santa Fe Red and Daytona White are featured.

OWNERSHIP of "more than one and one-half automobiles" is one distinction possessed by the average U.S. private pilot, according to a recent survey of members carried out by the Aircraft Owners and Pilots Association. This "composite man" flying his aircraft for business and pleasure has the following characteristics, also: he is a college man, earns $10,906 per year, participates in community affairs and prefers summer vacations. Twelve per cent of A.O.P.A. membership (which totals 65,000) are said to be presidents of business organizations; 702 are board chairmen; while 44 per cent hold "executive titles." The survey provides convincing proof, the Association points out, that private flying is no longer made up by the "helmeted, local daredevil in a leather jacket who flew his airplane by the seat of his pants."

REFERRING to our mention of the Auster Atlantic in *Flight's* "Business and Touring Aircraft" special issue of October 11, Auster Aircraft, Ltd., have written giving 1,030 lb as the estimated disposable load for this aircraft. Describing the machine's brake system, the company says that both mainwheel brakes are actuated simultaneously by a single lever, and there is no need for differential braking as the nosewheel is steerable through the rudder pedals.

[*Continued on page 754*

A CLEAR 3,000,000

Now comes the news of another fine achievement in British Aviation. The Rolls Royce Dart engine which powers the Vickers Viscount has completed 3,000,000 hours in airline service. Throughout this magnificent performance the Dunlop Thermal De-icing system has efficiently kept the engine intakes clear of ice formation under all conditions.

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Dunlop Rubber Co., Ltd. (Aviation Division), Foleshill · Coventry · England

md/634

Aer Lingus Success

Mr. J. F. Dempsey, Director and General Manager of Aer Lingus, said recently, "Our fleet of Viscounts played a major part in the success of our twenty-first year of operation, enhancing both our prestige and our business. They have enabled us to provide our passengers with a higher standard of complete comfort and speed. Our salesmen have had something extra to 'sell' in the Viscount and as a result our traffic has shown a steady increase since we acquired these excellent aircraft."

Pilots have many reasons for preferring the Viscount with its proved and reliable non-powered flying controls.

Viscount experience in service with over 20 airlines is being built into the simple functional cockpit and cabin layout of the new Viscount 810-840—ensuring for both pilots and passengers that comfort and freedom from strain which is now associated with Viscount travel. In this new Viscount the proved dependability of the airframe and the Rolls-Royce propeller-turbine, after ten years of development and 1½ million flying hours, means peace of mind for both crew and passengers. Quiet, smooth flight reduces fatigue and improves efficiency, while the rapid turnround due to ease of maintenance means less worry over schedules.

There is no substitute for experience

VICKERS-ARMSTRONGS (AIRCRAFT) LIMITED WEYBRIDGE SURREY

TGA AT5484

This week's "Flight" bears striking witness to foreign transport developments. Here, to complement the Tu-114 and Friendship pictures on other pages (for Electra progress see below) is the rolling-out at Seattle of the first production Boeing 707. It is due to fly just after Christmas. On the right is the first production DC-8 after wing-to-fuselage mating at Douglas Long Beach. It is due to fly next March.

CIVIL AVIATION

B.E.A.'s FARE INCREASES

FOR U.S. domestic operators, who have been unsuccessfully pressing the C.A.B. for fare increases for over a year, the comparative ease with which British European Airways can raise their fares must be a matter for envy. It was announced recently that B.E.A. fares to the Channel Islands—the airline's most competitive domestic route—are to be increased by ten per cent on April 1 next year, and increases in other domestic fares of up to 25 per cent are reported to be imminent.

Disappointment in the prospect of these increases is in no way lessened by the knowledge that they were expected, and that B.E.A. had declared in their annual report that they did not believe that it was possible or desirable to make international services finance the loss on domestic routes. Even the timing of the announcement, just after B.E.A. proudly announced a net operating profit of £1m on the results of August operations, can occasion little surprise; the Corporation have to make a substantial profit in the short peak summer season in order to balance their unprofitable winter services.

But John Public, as owner and user of the national airline, is justified in asking what steps have been taken to limit these increases to the irreducible minimum, and whether an organization on the lines of the C.A.B.—which could investigate (and if necessary veto) changes in the fare structure—is required in Great Britain. When B.E.A. decide that an increase is necessary (not a decision that is lightly taken) consultations are arranged with the Regional Advisory Councils concerned. These councils, the chairman of which is a Board member of B.E.A., serve the public in much the same way that a chamber of commerce serves the businessmen of a borough. The decision of the council (the regions are Scotland, Wales, Northern Ireland, Channel Is.) is then put before the independents (who are unlikely to bemoan an *increase* in the Corporation's fares) and passed to the Minister of Transport and Civil Aviation for approval. If he disagrees with the fare increase, or if the independents do so, the Minister can call upon his advisers within the M.T.C.A., but the Air Transport Advisory Council is not concerned with the regulation of B.E.A.'s fares.

Thus, apart from the general desire of all the parties concerned to avoid increases in fares, there is no expert and authoritative public body, with the avowed intention of keeping down fares by forcing maximum efficiency from the airlines, that can say "think again"; and for the second time in twelve months, B.E.A. domestic fares are going to be raised. The contrast between B.E.A. and the U.S. domestic airlines is all the more marked when re-equipment problems are considered; the latter are struggling to support the purchase of a jet standard of living in the face of capital shortage, whilst the nationalized Corporation are able to rely upon public loans for financing their new equipment.

But the problems of the American airlines are largely self-inflicted. They are crying out for higher fares and greater profits to attract more capital into the business. American Airlines, for example, have already borrowed £48m to finance the first phase of their jet-transport programme, and are hoping for earnings of £9m a year to support the acquisition of jets. Without higher fares (in the words of C. R. Smith, president of American Airlines) the public will not have the full benefits of turbine service by 1961 and would miss a "major breakthrough to a new phase of travel."

Yet however rosy-hued the attractions of jet speeds may be to the airline passenger, these are only *incidental* advantages of progress in air travel. The biggest pull, as only the C.A.B. now seems to recognize, is the attraction of the low fare. A.T.P.

THE COMET 4C

LAST week the de Havilland company announced a further addition to the Comet family. Designated 4C, it combines the lengthened-fuselage capacity of the 4B with the longer-span wing of the Comet 4.

Thus is the Comet, like the Boeing 707, now offered with two sizes of wing and two lengths of fuselage, which can be matched as required in any desired permutation to produce the Comet 4, 4B, or 4C. It seems likely, however, that the Comet export sales campaign is now being centred on two basic versions—each with the same Rolls-Royce Avon RA.29 power and the same volumetric payload capacity: the clipped-wing 4B for maximum block speeds over the shorter stages (as exemplified by B.E.A.'s requirement), and the 4C for maximum payload over the medium stages.

The Comet 4C can, it appears, be most simply regarded as a bigger-capacity stretch of the Comet 4, offering about 25 per cent more payload at the expense of about 15 per cent in maximum range. For example, the 4C can carry a payload of 21,785 lb (85 mixed-class passengers) over a stage length, with fuel allowances and reserves, of 2,475 statute miles.

The 4C seems to be such an improvement on the 4 that it is more likely to appeal to operators looking for medium-haul equipment. Such airlines will be more interested in payload than in range: the Comet 4's 3,000 st. m. stage-length with capacity payload is more than adequate for a medium transport, and is indeed overlapping into the realm of the big long-range jets.

This point is not likely to have escaped B.O.A.C., none of whose "Empire" stages greatly exceeds 2,000 statute miles. It seems logical to assume that some of their 19 Comet 4s may in fact be delivered as Comet 4Cs.

The de Havilland company describe the Comet 4C as an aircraft of "exceptional economy and versatility of operation in conditions where neither very long nor very short stages are the main consideration," adding that it is likely to find its principal application "among operators having medium-to-long stages branching out from a metropolitan network of short-stage routes."

MEXICO'S FIRST BRITANNIA

FOLLOWING unusually speedy acceptance trials, Aeronaves de Mexico have taken delivery of the first of their two Britannia 302s. With the airline's chief executive Sr. Carlos Ramos aboard, the aircraft (XA-MEC) arrived in Mexico City from Bristol on November 4 amid "scenes of wild enthusiasm." It is Aeronave's intent to inaugurate services on their new route to New York on December 6.

Here, complete with self-explanatory label, is Lockheed's first production Electra for Eastern Air Lines. It will be delivered in October of next year. The first Electra "looks ready to fly."

Here is the arrival of the first Viscount Safari service (operated jointly by Airwork and Hunting-Clan) at Ndola, Northern Rhodesia. This aircraft is one of Hunting-Clan's three V.732s, recently returned from Middle East Airlines. It has been chartered to Airwork, but Hunting operate their other two Viscounts in their own colours.

CIVIL AVIATION . . .

SPEED OF DECISION

TWO major projects which vitally concern the future of British air transport continue to await Government approval. One is the small jet airliner for B.E.A., the other the Millbourn development plan for London Airport. The success of both projects, and particularly the B.E.A. jet, hangs upon something which has come to be known in British manufacturing and operating circles as speed of decision.

There is anxiety that if the small jet is not started soon another big market will have been lost; and there is a feeling that if the long-term development of London Airport is not put in hand soon there will be desperate chaos there in a few years' time.

Why the apparent delay? The explanation is perhaps to be found in some words spoken last week by Mr. Harold Watkinson, Minister of Transport and Civil Aviation. On October 25 he said:

"The Government have tried to speak with the utmost frankness to the country about the measures we are taking to deal with inflation and the way in which we propose to carry them out. I hope that there is therefore no doubt in anybody's mind about the general principle that we are determined to implement, namely limiting the amount of money going into circulation so that industries or individuals who wish to take inflationary action of one kind or another will find that the Government will not provide the means to enable them to do it."

The amount of money required to develop the B.E.A. jet and L.A.P. is, of course, very great—perhaps £15m-£20m for the first project and £17m for the second (excluding the £16m rail link with the metropolis, in which Mr. Watkinson has recently affirmed his interest). But the Minister did go on to say:

"In the air, we have, of course, to press forward with our plans for civil aircraft. . . . We must go forward with the new aircraft projects of great interest and promise, such as the new VC-10 jet aircraft which B.O.A.C. have ordered from Vickers-Armstrongs. . . ."

The VC-10, of course, is being privately financed by Vickers. The B.E.A. jet, it seems, will require Government support (though Avro were at one time—and still are—prepared to go it alone with their project). Lord Douglas, chairman of B.E.A., after a lengthy appraisal of the contending designs (D.H.121, Bristol 200, Avro 735) told the Ministry of Supply what he wanted some three months ago. It can only be assumed that since then the Government, hard-pressed by the inflationary crisis, have been weighing the political, industrial and—above all—the financial considerations involved.

Visiting Rolls-Royce at Hucknall last month was Mr. W. M. Allen, president of the Boeing Airplane Co. He is inspecting the buried installation of Conways in the Vulcan with (left) Mr. J. D. Pearson of Rolls-Royce.

The aircraft firms concerned are watching with increasing anxiety the trend of the market in relation to their own commercial futures. They observe the airlines apparently becoming more and more receptive to the idea of a jet to operate the shorter-stage networks. The steadily increasing influence of the Caravelle on the minds of airline managements is an indication of this, and of the opportunity for a transport of this class which is technically styled to match the high-subsonic needs of the mid-sixties. It is an opportunity which must soon be grasped by the British industry, unless another market is to pass to the American industry. Less than a year ago (in December 1956), Mr. C. R. Smith, president of American Airlines, told Lockheed's management:

"When you get down to the mathematics of the short and medium distance runs, it is very difficult to see there is a place for the small jet. Prospects that the small jet will be built are pretty skinny. I doubt if enough of them can be sold. . . ." But this is what Mr. Smith said (to the C.A.B.) ten months later, on October 28, 1957: "To provide the needed service, America requires a fleet of 45 long-range jet airliners, *25 intermediate-range jet airliners* and 35 turboprop Electras. . . ."

This is American's first admission that they are planning on jets to back up Electras. No doubt Mr. Smith's "25 intermediate-range jets" will be Boeing 717s or Convair 880s. But it seems fair to detect in his change of outlook a trend in thinking towards the short-range jet. It is certainly odds-on that the American industry—perhaps Lockheed among them—have detected such a change in thinking, and are "getting down to the mathematics of the short and medium distance runs" with a view to building a jet for them.

Here is indeed a dilemma for the British industry, and for the government (or the private financial sources) to which it must turn. But the reward is a share of the market for 1,000 or more small jets which may (*Flight*, May 3, 1957) exist during the next two decades. And the nation first off the mark with something to deliver in 1962—five short years hence—stands to get the biggest share.

As for London Airport, perhaps the government's dilemma is as much technical as financial. The Millbourn proposals were open to criticism, which must now have been thoroughly reviewed by the government; but no less than B.E.A.'s jet does the planning of L.A.P.'s future development require speed of decision.

BLACKBURN TALK TRANSPORT

EVIDENCE of hard thinking by Blackburn about the commercial transport market was strongly apparent in the lecture by the company's technical director, Mr. N. E. Rowe, at Vickers-Armstrongs (Aircraft), Ltd., Weybridge, last week. He was giving the Rex Pierson Memorial Lecture.

His theme was the development of the transport aeroplane over the years, and it included an unusual presentation of the way operating cost has been related to work capacity and gross weight. We quote (taking the liberty of an occasional paraphrase):

"Cost is the sum of two terms, the first depending on the inverse of rate of transport work/lb of basic operational equipped weight, and the second on the inverse of the total transport work per lb of fuel carried. Mr. D. W. Wall, who has been helping me in the preparation of data, suggested plotting the reciprocal of minimum direct operating cost against the rate of transport work per lb of gross weight.

"The most striking thing is the lack of scatter from a mean line for all the aircraft fitted with propellers, reciprocating and turbine-engined. As might have been expected, jet-driven aircraft depart from the others; however, again there is little scatter—long and short range aircraft included. The interpretation of the two distinct mean lines in the proposed index applies only to comparisons of aircraft within the two groups, jet or propeller-driven aircraft. Presumably this distinction reflects in part the lower efficiency of the jets in converting energy in the fuel to thrust power. It is an interesting form of presenting the results which is new to me, though not to others I daresay; apparently the amount of transport done per unit cost is *directly* proportional to the maximum rate of transport work per unit of all-up weight."

CANADIAN VIEW OF VTOL

THE use of VTOL transports in Canada, particularly in the north, where there are few natural land airfields, is the concern of a recent National Aeronautical Establishment Report.*

The authors study the evolution of conventional transports and conclude that turboprops will have a potential VTOL capability (thrust exceeding weight) by 1962, and turbojets by 1972. Hence their VTOL projects are based upon turboprop powerplants and—as the result of further investigation—on a tilting wing rather than a deflected slipstream. Two types of aircraft are studied, both of which have a range of 500 miles: a twin-propeller machine with a payload of 2,000 lb and a four-propeller machine with a payload of 5,000 lb. The conclusions of the study are that (1) In most cases a propeller disc loading of 40 lb/sq ft and hovering tip speed of 600 ft/sec will result in the minimum gross weight; (2) this minimum is achieved at design cruising speeds of 200 to 300 m.p.h.; (3) power required for cruising at these speeds is 15 to 30 per cent of that for hovering, but when cruising at 400 to 500

**A Discussion of Canadian Requirements and Project Study Results for Tilting Wing Configurations with Two and Four Propellers.*

As recorded on this page, the Friendship has received its C.A.A. type certificate. The document is being handed to Mr. H. C. van Meerten, chief designer of Fokker, by Mr. R. B. Meyersburg of the C.A.A. Meanwhile, the fuselage of the first production Friendship, to be delivered to Aer Lingus next year, is nearing completion at Schiphol.

m.p.h. the powers would be about equal; (4) the direct operating cost of the four-propeller transport is a minimum for design cruising speeds of 250 to 300 m.p.h. and for the twin-propeller transport 300 to 400 m.p.h. These costs are 50 to 100 per cent higher than for conventional transports.

This leaves a good deal unsaid in regard to "VTOL transports or more concrete" arguments, but makes a reasonably convincing case for the use of VTOL aircraft rather than helicopters for development work in inaccessible areas. A shift of parameters to improve range at the expense of cruising speed would seem to be a requirement for the type of aircraft considered; and the report remarks that inter-city airline interest would probably not be very great, except perhaps in densely populated areas. As an inter-city bus, a greater payload than 5,000 lb would probably be required.

FRIENDSHIP CERTIFICATED

ON October 29, the Civil Aeronautics Administration issued a transport category type-certificate for the Fokker Friendship —which of course means the Fairchild Friendship. The Netherlands Department of Civil Aviation, acting on behalf of the C.A.A., were able to show that the Friendship, at its increased gross weight of 35,700 lb, complies with the CAR4b regulations, the C.A.A. "Special Conditions for the Type Certification of the Fokker F-27" and the C.A.B. Special Civil Air Regulation No. SR422. Dart engine and Rotol propellers are not, of course, new to the C.A.A. Both received type certificates (in the Viscount installation) in June 1955.

Certification has become an immensely complicated process since the days when (as Capt. O. P. Jones used to recall) the pilot waited impatiently at the aerodrome for certification to be completed so that he could spend the rest of the morning crew-training before the afternoon's inaugural flight. Nearly three full years have passed since Fokker applied to the C.A.A. for certification, and official C.A.A. flight testing was spread over 126 flights and 120 flying hours. Fokker can quote some impressive figures for the number of special demonstrations carried out in about 800 hours' flying with the two prototypes: in this time 300 hours' flying has been done on one engine, 60 single-engined take-offs have been made, and the aircraft has been stalled 1,115 times. The undercarriage has been operated normally 2,100 times and extended by the emergency system 100 times; flaps have been operated 10,500 times and 1,050 touch-downs have been made. The Friendship has been flown by 206 people, of whom 83 were airline pilots.

De-icing tests on inflatable pneumatic overshoes on the wings and tailplane are to be continued and finalized this winter; although they were included in the certification. The alternative de-icing system is by hot air ducting in the wings and Napier Spraymat on the tailplane.

STANDARD THOUGHTS ON THE FLIGHT DECK

WRITING in the October issue of the British Air Line Pilots' Association journal *The Log*, the technical secretary has some comments to make on the way in which pilot opinion is being increasingly solicited by aircraft manufacturers. Of the step-by-step processes that lead to the best cockpit layout he says:

"Possibly the only way in which the layout of a flight deck or group of controls can be finalized is by simulating the various flight procedures. But it is important to note that nothing can be considered finalized, as far as B.A.L.P.A. is concerned, until flight experience has been accumulated. In fact, a curve of flight deck efficiency against time proceeds on its upward way from the drawing-board by a series of stages. At the drawing-board stage efficiency is comparatively low. As more details are added and pilot-experience studied, the efficiency curve commences its upward climb until the prototype's first hours of flight have been completed.

"After the test pilot's reports there will be a significant upward step in the curve, followed by a more gradual ascent, until—in the case of an airliner—operators' procedures are established by route trials which result in another step in the learning curve of flight deck efficiency.

"What the Association wants is a standard pilot, not physically like the S.B.A.C.'s standard man, but with standard ideas based on pilot's safety and experienced opinions."

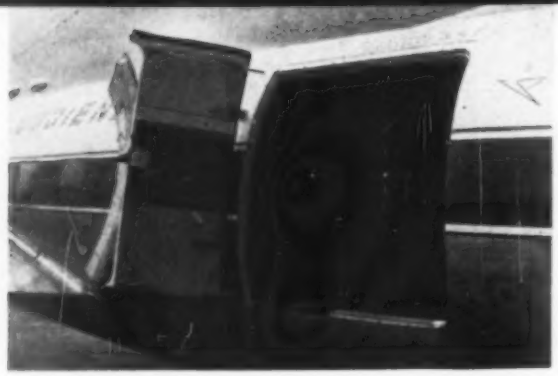
THAT NO-SHOW PROBLEM

PLAGUED by the reduction in load factors that occurred when passengers booked seats but failed to turn up for their flight, American domestic airlines have adopted stringent measures to strike at the root of this problem. The most important—and the most controversial—were time limits on reservations and penalty clauses; but when they were adopted this year the no-show problem was greatly reduced.

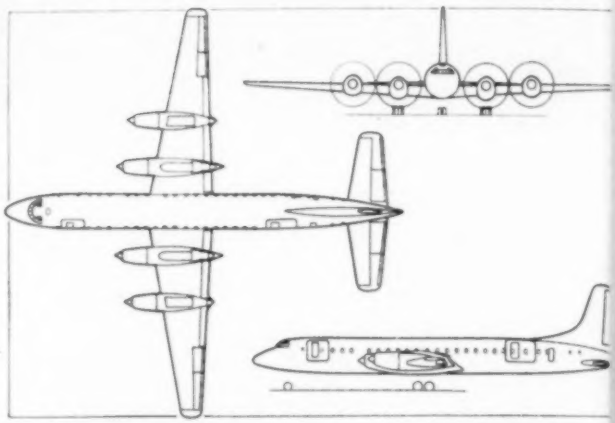
The same problem affects international travel as well, and at the Miami traffic conference I.A.T.A. decided to introduce next March similar ticketing time limits and reconfirmation procedures on services originating in Canada or the U.S., and on return trips to Canada and the U.S. from gateway points in Europe. Time limits will vary from place to place. On international services out of Canada, Cuba, Mexico and to the U.S., tickets booked more than three days before the flight are held for only 48 hours if they are not previously collected and paid for. If the booking is made less than three days before the flight, tickets must be collected as soon as possible.

Passengers leaving the U.S. or Canada on return trips or after stopovers of more than 12 hours will be required to reconfirm their reservations at least six hours before departure; and passengers who have return or continuing reservations to the U.S. and Canada from European gateways must reconfirm their reservations 48 hours before departure. Failure to do so would entitle the carrier airline to re-sell the space.

A special one-piece instrument panel has been installed in a Dove by Smiths Aircraft Instruments to demonstrate the Smith Flight Control and instrument systems. The conversion was carried out by Helliwells, Ltd., of Birmingham (Elmdon) Airport.



Eagle Aircraft Services, Ltd., were responsible for this ingenious freight-door modification to a Viking belonging to the German independent Deutsche Flugdienst. When the aircraft is being used for purely passenger work, only the original small door need be used. Eagle are modifying a second Viking for Flugdienst.



This is the first official three-view drawing of the Canadair CL-44C Britannia development. Immediately apparent is the striking increase in length—136ft 9in compared with 124ft 3in of the Britannia 310. Maximum seating capacity is 154 compared with 130.

CIVIL AVIATION . . . BREVITIES

UNITED AIR LINES' interest in the Convair 880 now seems very strong. The airline, according to the U.S. *Aviation Daily*, wants "a slightly different version"—possibly having a stretched fuselage. If U.A.L. order 880s, it seems likely that Northwest Airlines will too.

* * *

As from November 1, Eagle Aviation were represented on the Baltic Exchange by Lambert Brothers, Ltd.

* * *

PanAm flight engineers will be paid about 20 per cent more for service on the airline's DC-8s and Boeing 707s.

* * *

Sir George Edwards, managing director of Vickers-Armstrongs (Aircraft), Ltd., has forecast a market for the Vanguard of about 250 aircraft.

* * *

Rumours that S.A.S. are ordering 14 more Caravelles (see *Flight*, July 5, 1957) are prevalent. The airline, which placed a firm order for six last June, also took an option on 19.

* * *

The Australian Prime Minister, Mr. R. G. Menzies, opened Qantas House, Sydney, on October 28. The airline's new headquarters, on the corner of Hunter Street and Elizabeth Street, cost £1.3m.

* * *

Mr. F. W. Hancock, until recently Deputy Director of Overseas Navigational Services at M.T.C.A. headquarters and prior to that chief of the I.C.A.O. Secretariat's A.G.A. Section, has been appointed Assistant Commandant at London Airport.

* * *

Aer Lingus have forecast a deficit of about £100,000 for the current financial year, due to end on March 31, 1958. Passenger traffic has decreased, "due partly to the participation of B.E.A. in certain cross-Channel routes, formerly operated by Aer Lingus alone."

* * *

The Britannia 312 G-AOVB, which had been delayed at Miami pending the correction of the Proteus 755's compressor trouble, returned to London from New York on November 2. B.O.A.C.'s programme of transatlantic Britannia proving flights will now be resumed.

* * *

Air France will receive their first Caravelles in October next year, according to M. Georges Hereil, president of Sud-Aviation. He says that arrangements are in hand to produce an initial batch of 50 Caravelles (20 are ordered, and 34 are on option) and that existing facilities—which already include a sub-contracting system involving nine factories—can produce Caravelles at the rate of seven aircraft a month by 1960.

Aeroflot will introduce Tu-104s on the Moscow-Copenhagen route on December 7.

* * *

Lockheed's sales backlog stood at £360m on September 29, a 19 per cent decrease on the figure for a year ago.

* * *

The Guild of Air Pilots and Air Navigators announce the award of the Master Air Pilot certificate to Mr. Ronald Clear. He is a test pilot for de Havilland's Airspeed Division.

* * *

A DC-4 of the German independent Herfurtner crashed after taking off for New York from Dusseldorf on November 3. Of the ten people on board, five members of the crew and a woman passenger were killed.

* * *

Talks between France and the U.S.A., no doubt on the subject of Californian traffic rights for Air France, are to start in Washington on December 10. It will be recalled that last September the French threatened to refuse to allow PanAm's transpolar service to terminate in Paris on the ground that the bilateral agreement between the two countries needed renewing.

* * *

B.O.A.C. have appointed Capt. T. H. Farnsworth as deputy to Capt. J. N. Weir, chief of Flight Operations. Two new appointments have also been made on the staff of the Technical Manager (Flight Operations), Capt. M. J. R. Alderson. They are Capt. A. P. W. Cane, formerly in charge of the Comet 2E Flight, and Capt. H. J. Field, also formerly of the Comet 2E Flight. They will be responsible to Capt. Alderson for "special duties in connection with future projects." The new manager of the Comet Flight is Capt. T. B. Stoney.

CLUB AND GLIDING NEWS (continued from page 750)

ABOUT 110 people gathered last Friday at the Green Man, Kingsbury, London, for the annual dinner of Elstree Flying Club. They heard W/C. Eustace Miles, chairman of the A.B.A.C., speak of the work of the Association and some of its needs. For its member-organizations, the A.B.A.C. has concentrated on the "essential standardization by which the clubs may live," but, said W/C. Miles, they were puzzled by the lack of sustained interest by club pilots after they had obtained their P.P.L.s. Was it, he asked, a more advanced syllabus that was needed, or more opportunities to go touring? He appealed to club members to write and tell the A.B.A.C. their views.

Compliments and funny stories are the stock-in-trade of after-dinner speakers, but the members present could appreciate W/C. Miles' sincerity when he spoke of the high standard of training in which Elstree specialized, and an oblique reference to a successful forced landing made the previous week by a pupil who experienced a crankshaft failure was very well received.

ANOTHER annual dinner and dance, which guests attended from as far afield as Exeter and Baginton, was that of the Surrey Flying Club at the Greyhound Hotel, Croydon, also held on Friday last. A total of over 200 people attended the function, at which the guests of honour were the Czechoslovak Military and Air Attaché, Lt-Col. O. Pribyl, and Mrs. Pribyl. While for most of the evening the problem of the future of Croydon Airport, the Surrey club's base, was forgotten in favour of more pleasant topics of discussion, the hope that "someone in authority will have the elementary intelligence *not* to close down Croydon" was voiced.

Club trophies awarded during the evening comprised the Harris Trophy for the most outstanding flight, to Geoff Pearce, who participated in the 1957 aerial Tour de France; the Thurston Trophy for the best student pilot to obtain his P.P.L., to Ray Moore; and the G/C. Grece Trophy, for good performance in an emergency, to Neal Wates, who had landed his Tiger Moth safely after the throttle-linkage had broken.

SERVICE AVIATION

Royal Air Forces' and Naval Aviation News

This fine new study of a mixed bag of aircraft flown by instructors of the C.F.S., Little Rissington, on routine training was taken by Russell Adams from a Vampire T.11. In the Hunter F.4 was F/L. J. A. McArthur; in the T.11 Vampires, F/L. T. W. Morris (No. 2) and F/L. D. J. Evans (No. 3); flying the Meteor 7 was F/L. M. W. Bradley, a member of the Provost aerobatic team "The Sparrows." Pilot of the photographic Vampire was F/L. A. Bannerman.

Pinecastle Positions

AFTER five missions had been flown in the Strategic Air Command bombing and navigation competition, the B-47 Wing from Pinecastle was leading with 1,719 points and second were the B-47s from Pease A.F.B. with 1,653. The R.A.F. Valiants were at that time—the contest was due to end last Tuesday—lying 23rd with 1,407 points and the Vulcans 44th with 1,205 pts. In the navigation competition the Vulcans were then 26th with 363 pts and the Valiants 25th with 365; in the bombing the Valiants were 23rd with 1,102 pts and the Vulcans 45th with 842. There are 66 U.S.A.F. aircraft—ten B-52s in addition to the 56 B-47s—in the competition, which began on October 30.

In both the bombing and navigation contests, the Valiant captained by S/L. R. W. Payne has so far been the most successful R.A.F. aircraft, coming 15th with 763 pts in the overall contest.

Aircraft Carriers Appointment

A NEW appointment as Flag Officer Aircraft Carriers has been announced by the Admiralty. Vice-Admiral A. N. C. Bingley is to succeed Acting Rear Admiral H. C. D. MacLean—whose appointment to this post was announced only last month (*Flight*, October 18)—in January next year.

Vice-Admiral Bingley has been a Lord Commissioner of the Admiralty, Fifth Sea Lord and Deputy Chief of Naval Staff (Air) since June 1954. Among his wartime appointments were command of the escort carriers H.M.S. *Slinger* and *Biter* and later of a mobile air base; and from November 1952 until December 1953 he commanded H.M.S. *Eagle*. Promoted to flag rank in 1954, he became C.B. in 1956, having been made O.B.E. in 1942.

German F.A.A. Training

GERMAN pilots, observers and naval ratings who will form the West German naval air arm are being trained at R.N. air stations in this country and by the Fairey Aviation Co., Ltd. Twelve of the pilots due to fly Sea Hawks are receiving instruction at R.N.A.S. Lossiemouth and 12 Gannet pilots are being trained by Faireys and two R.N. instructors. German observers are doing a nine-month course at Culdrose; maintenance ratings are also being trained there (on Gannets) and at Brawdy on Sea Hawks. This training follows orders placed by the West German Government earlier this year for 68 Armstrong Whitworth Sea Hawks and 16 Fairey Gannets.

Negombo Handed Over

FOURTEEN years' R.A.F. tenure of the airfield at Katuanayake, near Negombo in Ceylon, ended last Friday when it was formally handed over to the Ceylon Government by the Deputy High Commissioner, Mr. T. L. Crosthwaite. But the R.A.F. has been asked to stay there until the Ceylon Air Force is ready to take over, which may not be for another five years.

Building of Katuanayake (better known to R.A.F. crews on the Far East route as Negombo) was begun in 1943 and it was originally intended as an advanced bomber base. It costs about £153,000 a year to run and the British Government will continue to pay this as long as the R.A.F. continues to use Negombo, which will eventually be replaced by the new airfield at Gan in the Maldive Islands.

Vulcan Exit Facilities

THERE is to be no change in the arrangements for emergency crew escape from the Avro Vulcan, at present fitted with ejection seats for the two pilots and a downward-opening hatch for the other crew members.

Since the Vulcan accident at London Airport just over a year ago, when the pilots escaped by low-level ejection and the other four occupants of the aircraft were killed, the problem has been exhaustively considered by the Air Council. They are satisfied that the structural difficulties involved in the installation of upward-firing ejection-seats could not be overcome without excessive delay and without imposing unacceptable penalties in the build-up of the V-bomber force; and that downward-firing seats would be entirely unacceptable for low-altitude escape.

A spokesman for A. V. Roe and Co., Ltd., makers of the Vulcan, said that a modification providing for upward ejec-

G/C. W. J. Burnett, commander of the R.A.F. detachment at Pinecastle A.F.B. for the S.A.C. competition, receives (left) the key of the city of Orlando from Mayor Carr; below left, one of the three Neptune crews of No. 11 Sqn., R.A.A.F., who made a round-the-world flight earlier this year, with Mr. P. Mingrone, Lockheed representative in Australia, who presented them with commemorative plaques; and below right, at No. 68 Sqn.'s annual reunion dinner at the Dorchester Hotel, London, when squadron badges were presented as mementos to members of the staff by S/L. M. T. Harding (second from left). W/C. A. P. Dottridge, who presided, is second from the right, and staff in the group are Messrs. L. Grossman, D. Harding (assistant banqueting manager) and S. Jacobs.

SERVICE AVIATION . . .

tion for the non-pilot crew members had been devised following the L.A.P. accident in conjunction with the Martin-Baker Aircraft Co., Ltd., and details had been sent to the Air Ministry.

Souvenir Spitfire

WHEN R.A.F. Oldenburg was formally handed over to the German Air Force last month, one of the R.A.F.'s personal treasures there—a Spitfire 9, rescued from a scrapheap at Eindhoven and presented by No. 14 Sqn. to No. 124 Wing—was taken to Ahlhorn, where the squadron is now based. A photograph of this Spitfire (painted in its original "zebra" invasion colours) was published in *Flight* for May 17, p. 678.

Aden Beverleys

DESCRIBING operations in the Aden Protectorate by Blackburn Beverleys on detachment from Abingdon, F/L. R. H. Pitman of No. 53 Sqn. writes of the smallness, high altitude and mountainous surroundings of most of the landing strips the aircraft use. Mukerias, for example, is 6,700ft up; and D'hala (altitude 4,500ft) has a runway only 700 yd long with a mountain at one end, making overshoot impossible. Beihan lies in a narrow gorge surrounded by mountains up to 8,000ft and with hills of approximately 2,000ft within the circuit. F/L. Pitman defines an approach there as "tricky, to say the least." After an initial glimpse of the airstrip—from a circuit flown between gaps in the hills—"one sees no more of it until the runway appears about a mile ahead." Some of the landing grounds are sandy and soft, some stony; the Beverley's ten wheels help to disperse its weight and minimize damage to surfaces. Payloads vary from a maximum of 30,000 lb to only about 4,000 lb (out of D'hala), and have ranged from an 11-ton armoured car lifted from Riyan to "an appropriately secured madman" who was flown out of Ataq.

R.A.F. Appointments

AMONG R.A.F. appointments recently announced by Air Ministry are the following:—

G/C. A. Muir to the R.A.F. Hospital, St. Athan, to command; G/C. L. C. Dennis to H.Q., Transport Command, for administrative staff duties.

W/C. S. H. Bonser to Air Ministry, for duty in the Department of the Air Member for Supply and Organization (with acting rank of group captain); W/C. H. Bentley to R.A.F. Lyneham, for technical duties; W/C. I. A. J. Edwards-Stuart to H.Q., Home Command, for civil defence plans duties; W/C. C. G. Harold to H.Q., No. 25 Group, as senior medical officer; W/C. F. D. Holmes to H.Q., Bomber Command, for administrative staff duties; W/C. F. Parvin to R.A.F. Seletar, for technical duties; W/C. E. J. Penton-Voak to No. 103 M.U., to command; W/C. E. W. Poppy to H.Q., Fighter Command, for administrative staff duties; W/C. S. M. Rigg to H.Q., No. 3 Group, as senior medical officer; W/C. A. C. Whitfield to Air Ministry, for duty in the Department of the Air Member for Supply and Organization; W/C. W. J. F. Fenton to H.Q., Levant, for administrative staff duties; W/C. P. C. Wright to R.A.F. Finningley, for technical duties; W/C. D. N. Corbyn to Air Ministry, for duty in the Department of the Air Member for Supply and Organization (with acting rank of group captain); W/C. C. R. B. Wigfall to H.Q., M.E.A.F., for administrative staff duties; W/C. E. W. T. Hardie to Air Ministry, for duty in the Department of the Air Member for Supply and Organization (with acting rank of group captain); W/C. J. M. S. Adams to the Ministry of Supply; Acting W/C. R. J. Bartlett to H.Q., M.E.A.F., for technical staff duties.

S/L. A. P. G. Holden to Air Ministry, for duty in the Department of the Air Member for Supply and Organization (with acting rank of wing commander); S/L. J. H. McMichael to Base Accounts Office, Innsworth, to command (with acting rank of wing commander); S/L. S. J. B. Snowden to No. 238 M.U., to command (with acting rank of wing commander); S/L. J. Trotman to H.Q., Maintenance Command, for administrative staff duties (with acting rank of wing commander).

IN BRIEF

Air Chief Marshal Sir Dermot Boyle, the C.A.S., is to lay a wreath at the Cenotaph on behalf of the R.A.F. during the memorial service in Whitehall on Remembrance Sunday this weekend.

* * * * *

The R.A.F. Benevolent Fund has received £235 7s 6d as a result of the collection taken in Westminster Abbey on Battle of Britain Sunday.

* * * * *

A.V-M. Sir L. F. Sinclair, formerly A.O.C. at Aden, has returned home to succeed Maj-Gen. P. N. White as Commandant of the Joint Services Staff College when his term of office expires next year.

* * * * *

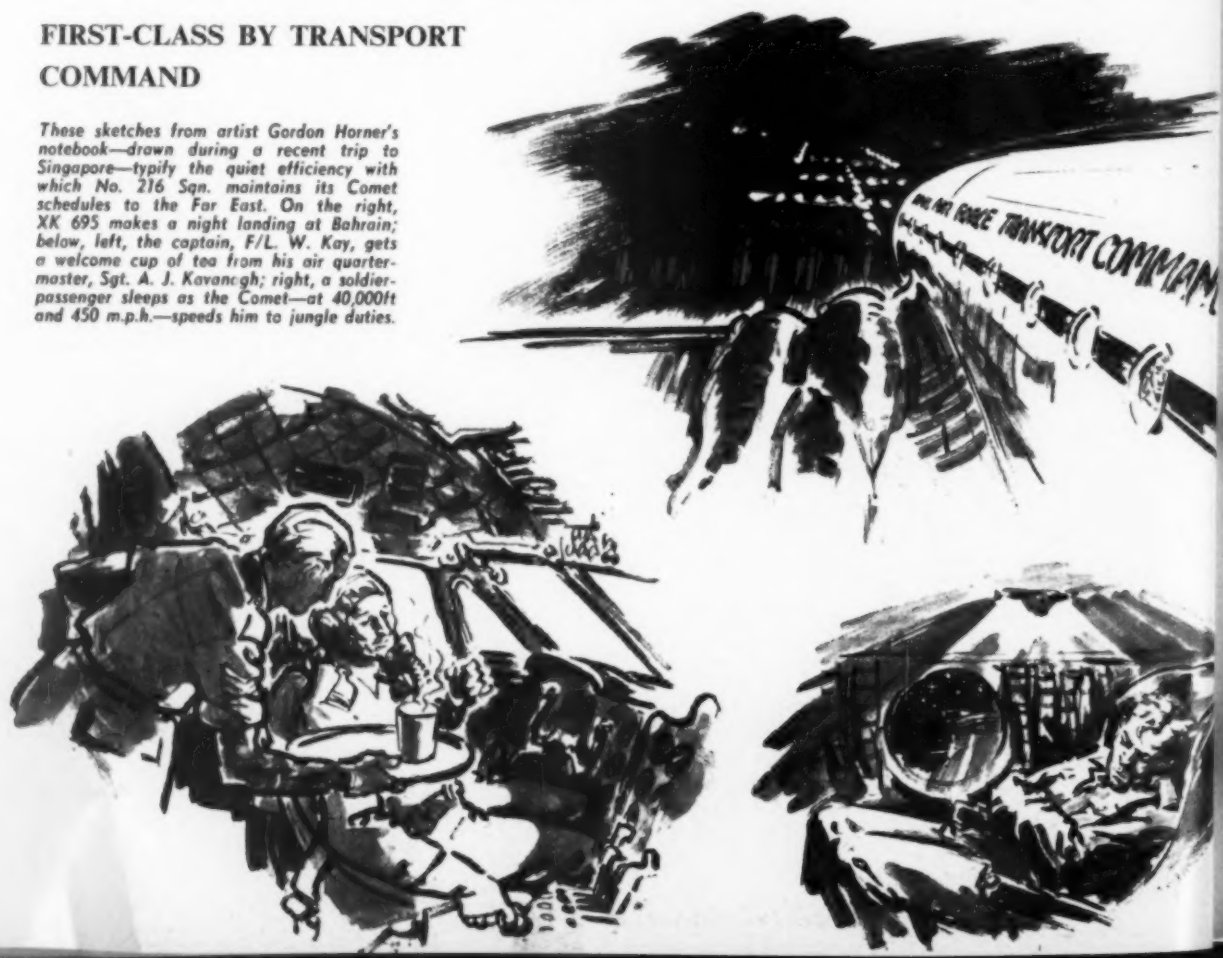
Set up as part of the Canada/U.S. Pinetree chain, the R.C.A.F. radar station at Tofino, B.C., on the west coast of Vancouver Island, is to be closed and all personnel will be withdrawn by the end of January next year.

* * * * *

As an act of remembrance this Sunday, members of the R.A.F. Air-Sea Rescue and Marine Craft Sections Club will lay a wreath in the English Channel from the No. 1107 M.C.U. search and rescue launch *Newhaven* at a ceremony attended by representatives of the Goldfish Club.

FIRST-CLASS BY TRANSPORT COMMAND

These sketches from artist Gordon Horner's notebook—drawn during a recent trip to Singapore—typify the quiet efficiency with which No. 216 Sqn. maintains its Comet schedules to the Far East. On the right, XK 695 makes a night landing at Bahrain; below, left, the captain, F/L. W. Kay, gets a welcome cup of tea from his air quartermaster, Sgt. A. J. Kavanagh; right, a soldier-passenger sleeps as the Comet—at 40,000ft and 450 m.p.h.—speeds him to jungle duties.



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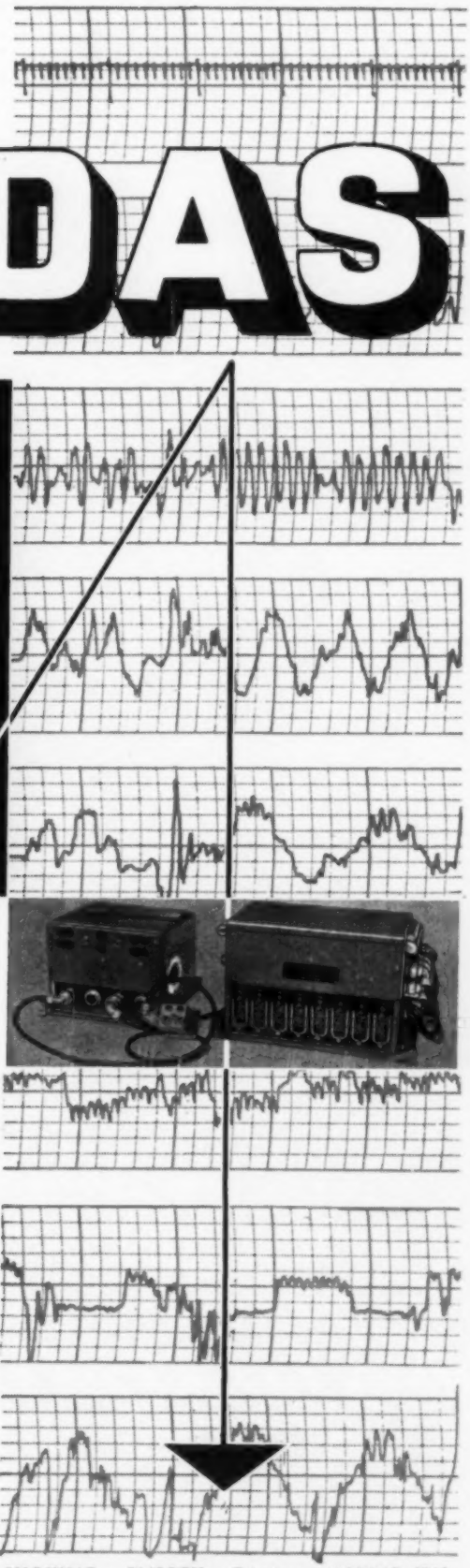

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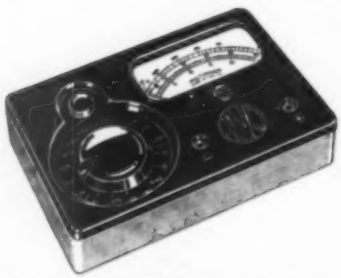

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0— 250 V.	
0—1,000 V.	

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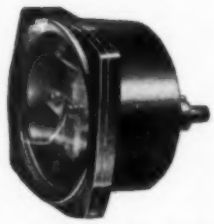

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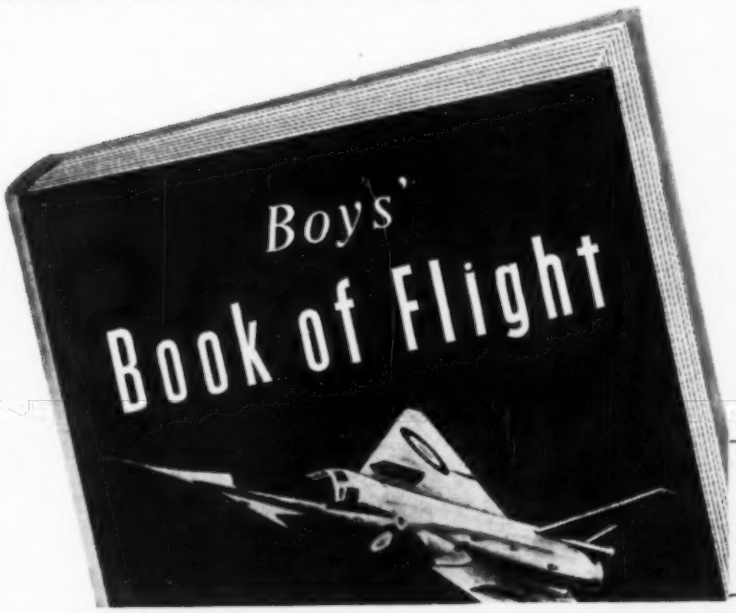

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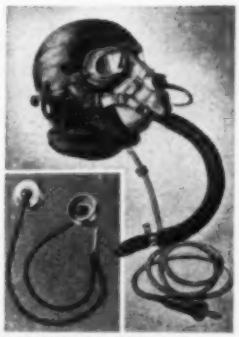

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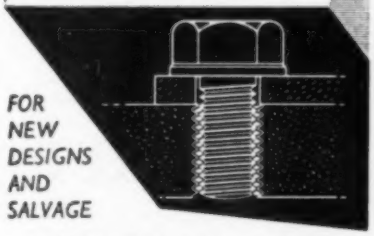

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APPLICATION No. 151/4 from Britavia Ltd., of 1, Great Cumberland Place, London, W.1, for an amendment to the terms of approval of the Normal Scheduled Service which they are authorised to operate on the routes (a) Southampton Water-Lisbon-Madeira, (b) Madeira-Las Palmas, (c) Madeira-Lisbon and (d) Southampton Water-Lisbon-Las Palmas until 31st December, 1962, so as to remove the present ban on the exercise of traffic rights between Southampton and Lisbon.

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INDEX TO ADVERTISERS

	Page
Alvis, Ltd.	Cover i
Amphenol (Great Britain), Ltd.	25
Automotive Products Co., Ltd.	20, Cover ii
Avica Equipment, Ltd.	24
Avo, Ltd.	26
Blackburn and General Aircraft, Ltd.	19, 30
Box No. 2420	27
Box No. 2663	32
B.P. Aviation Service	Facing Edit. Page 745
Bristol Aero-Engines, Ltd.	Cover iv
British Institute of Engineering Technology	29
Central Office of Information (R.A.F.)	Between Edit. Pages 744/5
Cross Manufacturing Co. (1938), Ltd.	29, 30
Cyprus Airways, Ltd.	28
De Havilland Aircraft of Canada, Ltd.	7
De Havilland Aircraft Co., Ltd., The	Facing Edit. Page 737
De Havilland Engine Co., Ltd., The	32
Derby Aviation, Ltd.	28
Desoutter Brothers, Ltd.	12
Dunlop Rubber Co., Ltd.	21
Elliott Brothers (London), Ltd.	32
English Electric Co., Ltd., The	11, 27
Fairey Aviation Co., Ltd., The	Facing Edit. Page 736
Field Aircraft Services, Ltd.	29
Firth and John Brown Ltd., Thos.	1
Firth-Vickers Stainless Steels, Ltd.	4
Fishers	29
Fokker	3
General Electric Co., Ltd., The	5
Godfrey and Partners, Ltd., Sir George	9
Haig's Fund, Poppy Day	28
Handley Page, Ltd.	31
Iliffe and Sons, Ltd.	27
Jenks Brothers, Ltd.	24
Lewis, Ltd., D.	29
Leytonstone Jig and Tool Co., Ltd.	26
London School of Air Navigation	30
Lucas (Gas Turbine Equipment), Ltd., Joseph	Cover iii
Marshall's Flying School, Ltd.	30, 31, 32
Mervyn Instruments	23
Munro, Ltd., R. W.	26
Newton Brothers (Derby), Ltd.	26
Palmer Tyre, Ltd., The	2
Parsons and Marine Engineering Turbine Research and Development Association, The	31
Robinson and Co. (Gillingham), Ltd., L.	24
Roe and Co., Ltd., A. V.	10
Shell-Mex and B.P., Ltd.	Facing Edit. Page 744
Teddington Aircraft Controls, Ltd.	8
Thorn Electrical Industries, Ltd.	6
Uhlhorn Brothers, Ltd.	27
Venner, Ltd.	25
Vickers-Armstrongs (Aircraft), Ltd.	22
Wilson and Sons (London), Ltd., W.	8

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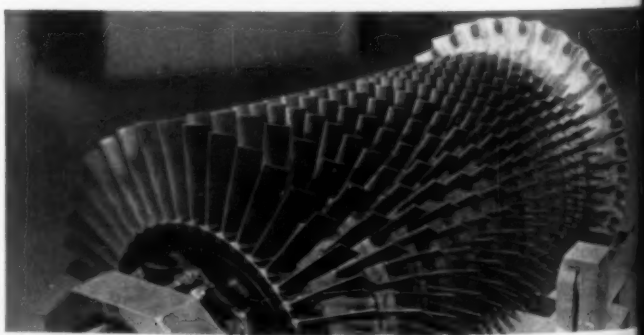

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